الملاحـــــــــق

ملحق رقم (1)
متغيرات دالة الطلب على النقود في السودان (1970م – 2013م)

Obs	MD	GDP	INF	CF	ER
1970	0.13	0.60	Na	1.00	0.00
1971	0.14	0.64	0.97	4.00	0.00
1972	0.17	0.75	10.09	4.00	0.00
1973	0.20	0.90	16.02	6.00	0.00
1974	0.27	1.25	25.42	6.00	0.00
1975	0.31	1.51	22.65	8.00	0.00
1976	0.38	1.85	17.00	8.00	0.00
1977	0.53	2.34	17.18	8.00	0.00
1978	0.71	2.88	18.32	8.00	0.00
1979	0.94	3.25	33.91	8.00	0.01
1980	1.23	3.97	26.09	8.00	0.01
1981	1.57	4.95	22.56	10.0	0.01
1982	2.16	7.04	27.69	10.0	0.01
1983	2.77	9.59	31.13	12.0	0.01
1984	3.26	11.81	32.45	14.0	0.03
1985	6.02	15.36	46.33	16.0	0.03
1986	7.76	20.22	29.04	16.0	0.03
1987	10.41	36.74	24.98	11.0	0.05
1988	14.21	46.79	49.14	20.0	0.05
1989	22.71	82.56	74.08	22.0	0.05
1990	31.64	110.11	67.38	29.0	0.05
1991	52.70	192.66	122.52	28.0	0.05
1992	141.60	421.82	119.24	32.9	0.10
1993	268.58	948.45	101.18	27.2	0.13
1994	405.35	1881.29	115.93	27.0	0.22
1995	705.87	4049.74	68.97	28.0	0.40
1996	1165.99	10478.14	130.44	30.0	1.25
1997	1597.14	16137.37	47.19	41.7	1.58
1998	2069.51	21935.91	17.01	36.3	1.99
1999	2579.18	27058.81	16.16	30.0	2.52
2000	3466.71	33662.71	8.02	21.5	2.57
2001	4322.13	37629.74	4.92	13.7	2.59
2002	5632.67	42835.54	8.30	8.30	2.63

2003	7392.13	49713.36	7.70	16.5	2.61
2004	9604.47	49106.62	8.46	10.8	2.58
2005	13781.89	64328.76	8.50	11.2	2.31
2006	17871.77	80015.78	7.20	10.4	2.17
2007	19714.62	93299.65	8.20	11.4	2.02
2008	22933.16	127746.90	14.30	11.35	2.09
2009	28314.48	135659.00	11.20	10.8	2.31
2010	35497.90	162203.90	13.00	9.7	2.31
2011	41853.10	186689.90	18.1	7.9	3.57
2012	58663.29	243412.80	35.1	11.3	4.75
2013	66445.70	294630.20	37.1	12.0	4.75

المصدر: بنك السودان المركزي

ملحق رقم (2)

نتائج اختبارديكي فولر

استقرار متغير الطلب على النقود

-3.5930	1% Critical Value*	9.363482	ADF Test Statistic
-2.9320	5% Critical Value		
-2.6039	10% Critical Value		

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(MD)
Method: Least Squares
Date: 10/14/14 Time: 13:42
Sample(adjusted): 1972 2013
Included observations: 42 after adjusting endpoints

Prob.	t-Statistic	Std. Error	Coefficient	Variable
0.0000	9.363482	0.047893	0.448445	MD(-1)
0.0000	-5.155882	0.205812	-1.061144	D(MD(-1))
0.6564	0.448313	212.9257	95.45738	C

1582.037	Mean dependent var	0.860275	R-squared
3199.103	S.D. dependent var	0.853110	Adjusted R-squared
17.12981	Akaike info criterion	1226.095	S.E. of regression
17.25393	Schwarz criterion	58629097	Sum squared resid
120.0602	F-statistic	-356.7259	Log likelihood
0.000000	Prob(F-statistic)	1.914502	Durbin-Watson stat

تابع ملحق رقم (2)

استقرار متغير الناتج المحلي الاجمالي

-3.5930	1% Critical Value*	7.958676	ADF Test Statistic
-2.9320	5% Critical Value		
-2.6039	10% Critical Value		

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDP)
Method: Least Squares
Date: 10/14/14 Time: 13:32
Sample(adjusted): 1972 2013
Included observations: 42 after adjusting endpoints

Prob.	t-Statistic	Std. Error	Coefficient	Variable
0.0000	7.958676	0.035532	0.282791	GDP(-1)
0.0277	-2.286346	0.182353	-0.416922	D(GDP(-1))
0.9375	0.078949	934.4842	73.77623	C

7014.992	Mean dependent var	0.851868	R-squared
13302.13	S.D. dependent var	0.844271	Adjusted R-squared
20.03835	Akaike info criterion	5249.353	S.E. of regression
20.16247	Schwarz criterion	1.07E+09	Sum squared resid
112.1390	F-statistic	-417.8053	Log likelihood
0.000000	Prob(F-statistic)	1.913646	Durbin-Watson stat

استقرار متغير التضخم

-3.6019	1% Critical Value*	-4.553195	ADF Test Statistic
-2.9358	5% Critical Value		
-2.6059	10% Critical Value		

*MacKinnon critical values for rejection of hypothesis of a unit root.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INF,2)
Method: Least Squares
Date: 10/14/14 Time: 13:34
Sample(adjusted): 1974 2013
Included observations: 40 after adjusting endpoints

Prob.	t-Statistic	Std. Error	Coefficient	Variable
0.0001	-4.553195	0.267745	-1.219095	D(INF(-1))
0.6156	-0.506367	0.164550	-0.083323	D(INF(-1),2)
0.8457	0.196032	3.470883	0.680404	C

-0.098250	Mean dependent var	0.667537	R-squared
37.05121	S.D. dependent var	0.649566	Adjusted R-squared
9.085934	Akaike info criterion	21.93337	S.E. of regression
9.212600	Schwarz criterion	17799.68	Sum squared resid
37.14533	F-statistic	-178.7187	Log likelihood
0.000000	Prob(F-statistic)	2.035248	Durbin-Watson stat

تابع ملحق رقم (2)

استقرار متغير تكلفة التمويل

-3.5930	1% Critical Value*	-6.224106	PP Test Statistic
-2.9320	5% Critical Value		
-2.6039	10% Critical Value		

*MacKinnon critical values for rejection of hypothesis of a unit root.

(Newey-West suggests: 3)	Lag truncation for Bartlett kernel: 3
17.38001	Residual variance with no correction
18.46845	Residual variance with correction

Phillips-Perron Test Equation
Dependent Variable: D(CF,2)
Method: Least Squares
Date: 10/14/14 Time: 13:37
Sample(adjusted): 1972 2013
Included observations: 42 after adjusting endpoints

Prob.	t-Statistic	Std. Error	Coefficient	Variable
0.0000	-6.214198	0.157266	-0.977285	D(CF(-1))
0.7809	0.280035	0.660294	0.184905	C

-0.054762	Mean dependent var	0.491199	R-squared
5.915398	S.D. dependent var	0.478479	Adjusted R-squared
5.788436	Akaike info criterion	4.271886	S.E. of regression
5.871182	Schwarz criterion	729.9605	Sum squared resid
38.61626	F-statistic	-119.5572	Log likelihood
0.000000	Prob(F-statistic)	2.005726	Durbin-Watson stat

استقرارمتغير سعر الصرف

-3.5973	1% Critical Value*	-3.481957	ADF Test Statistic
-2.9339	5% Critical Value		
-2.6048	10% Critical Value		

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(ER,2)
Method: Least Squares
Date: 10/14/14 Time: 13:40
Sample(adjusted): 1973 2013
Included observations: 41 after adjusting endpoints

Prob.	t-Statistic	Std. Error	Coefficient	Variable
0.0013	-3.481957	0.228002	-0.793893	D(ER(-1))
0.4157	-0.822914	0.179120	-0.147401	D(ER(-1),2)
0.1528	1.458816	0.065956	0.096218	C

0.000000	Mean dependent var	0.473023	R-squared
0.531324	S.D. dependent var	0.445287	Adjusted R-squared
1.054161	Akaike info criterion	0.395725	S.E. of regression
1.179544	Schwarz criterion	5.950734	Sum squared resid
17.05468	F-statistic	-18.61030	Log likelihood

0.000005	Prob(F-statistic)	2.018938	Durbin-Watson stat

ملحق (3)

نتائج اختبار جوهانسون للتكامل المشترك :

Likelihood Ratio	5percent critical value	Hypothesized No.CE(s)
157.9636	**68.52**	**None ****
55.81434	**47.21**	**At most 1 ****
30.41184	**29.68**	**At most 2 ****
18.24695	**15.41**	**At most 3 ***
6.190665	**3.76**	**At most 4**

ملحق رقم (4)

تقديرالدالة اللوغريثمية للطلب على النقود :

Dependent Variable: LOG(MD)
Method: Least Squares
Date: 10/25/14 Time: 03:45
Sample(adjusted): 1979 2013
Included observations: 35 after adjusting endpoints

Prob.	t-Statistic	Std. Error	Coefficient	Variable
0.0132	-2.633360	0.683898	-1.800950	C
0.0185	2.490854	0.071244	0.177457	LOG(INF)
0.0000	16.05961	0.067860	1.089801	LOG(GDP)
0.0593	-1.960597	0.126261	-0.247547	LOG(ER)
0.0002	-4.244094	0.110362	-0.468388	LOG(CF)

6.055016	Mean dependent var	0.996421	R-squared
3.711343	S.D. dependent var	0.995944	Adjusted R-squared
0.084747	Akaike info criterion	0.236372	S.E. of regression
0.306940	Schwarz criterion	1.676157	Sum squared resid
2087.999	F-statistic	3.516923	Log likelihood
0.000000	Prob(F-statistic)	0.843211	Durbin-Watson stat

ملحق رقم (5)
مصفوفة الارتباط

Correlation Matrix

	MD	GDP	INF	CF	ER
MD	1.000000	0.994148	-0.202276	-0.225545	0.822983
GDP	0.994148	1.000000	-0.235180	-0.207044	0.860915
INF	-0.202276	-0.235180	1.000000	0.650996	-0.316909
CF	-0.225545	-0.207044	0.650996	1.000000	-0.054091
ER	0.822983	0.860915	-0.316909	-0.054091	1.000000

ملحق رقم (6)
اختبار الكشف عن مشكلة اختلاف التباين اختباروايد :

White Heteroskedasticity Test:

0.052180	Probability	2.202773	F-statistic
0.065699	Probability	14.67884	Obs*R-squared

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 10/14/14 Time: 13:49
Sample: 1971 2013
Included observations: 43

Prob.	t-Statistic	Std. Error	Coefficient	Variable
0.6678	-0.432990	3326203.	-1440212.	C
0.0062	2.916409	79.03809	230.5074	GDP
0.0148	-2.568472	0.000343	-0.000880	GDP^2
0.9184	-0.103207	178824.7	-18455.93	INF
0.9085	0.115782	1119.723	129.6432	INF^2
0.6891	0.403460	563195.6	227227.0	CF
0.7753	-0.287789	10845.61	-3121.250	CF^2
0.0858	-1.769123	5043153.	-8921960.	ER
0.0728	1.851684	1240211.	2296479.	ER^2

1599434.	Mean dependent var	0.341368	R-squared
5390721.	S.D. dependent var	0.186396	Adjusted R-squared
33.81574	Akaike info criterion	4862430.	S.E. of regression
34.18436	Schwarz criterion	8.04E+14	Sum squared resid
2.202773	F-statistic	-718.0384	Log likelihood
0.052180	Prob(F-statistic)	2.489711	Durbin-Watson stat

ملحق رقم (7)

نتائج تقديردالة الطلب على النقود في السودان بعد معالجة المشاكل القياسية:

Dependent Variable: LOG(MD)

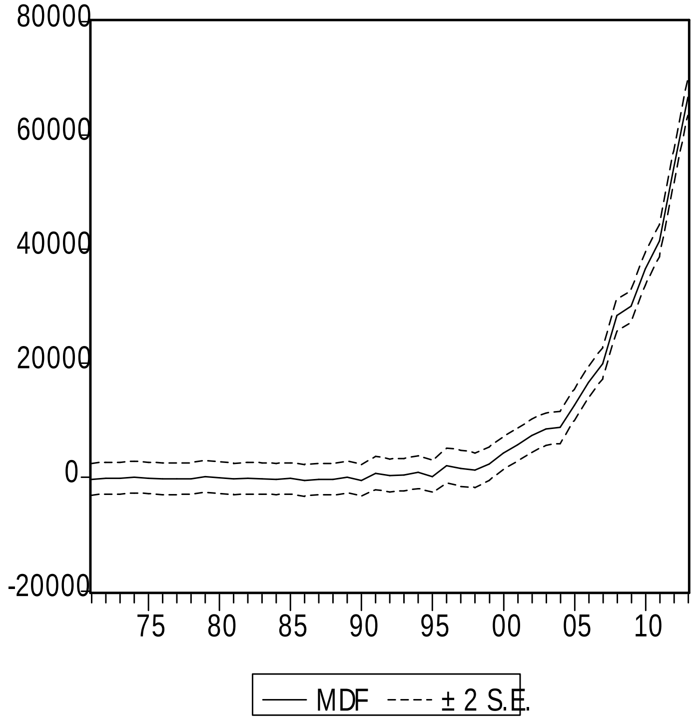
Method: Least Squares
Date: 10/22/14 Time: 23:13
Sample(adjusted): 1971 2013
Included observations: 43 after adjusting endpoints

Prob.	t-Statistic	Std. Error	Coefficient	Variable
0.0000	-6.220370	0.196167	-1.220228	C
0.0031	-3.151203	0.114981	-0.362329	LOG(CF)
0.0006	3.745445	0.062906	0.235610	LOG(INF)
0.0000	83.50202	0.011748	0.980964	LOG(GDP)
4.701223	Mean dependent var		0.996198	R-squared
4.405908	S.D. dependent var		0.995906	Adjusted R-squared
0.394044	Akaike info criterion		0.281923	S.E. of regression
0.557876	Schwarz criterion		3.099746	Sum squared resid
3406.301	F-statistic		-4.471939	Log likelihood
0.000000	Prob(F-statistic)		0.539775	Durbin-Watson stat

Dependent Variable: LOG(MD)
Method: Least Squares
Date: 10/25/14 Time: 03:54
Sample(adjusted): 1980 2013
Included observations: 34 after adjusting endpoints
Convergence achieved after 18 iterations

Prob.	t-Statistic	Std. Error	Coefficient	Variable
0.3552	0.940079	14.89097	13.99868	C
0.7932	0.264609	0.050837	0.013452	LOG(INF)
0.0000	5.332988	0.104194	0.555664	LOG(GDP)
0.5972	-0.534463	0.060197	-0.032173	LOG(ER)
0.8384	0.205883	0.085974	0.017701	LOG(CF)
0.0000	69.73608	0.014169	0.988076	AR(1)
6.234925	Mean dependent var		0.998993	R-squared
3.608917	S.D. dependent var		0.998813	Adjusted R-squared
-1.173245	Akaike info criterion		0.124313	S.E. of regression
-0.903887	Schwarz criterion		0.432703	Sum squared resid
5556.842	F-statistic		25.94516	Log likelihood
0.000000	Prob(F-statistic)		1.697100	Durbin-Watson stat
.99				Inverted AR Roots

ملحق رقم (8)
اختبار مقدرة النوذج على التنبؤ



Forecast: MDF
Actual: MD
Forecast sample: 1970 2013
Adjusted sample: 1971 2013
Included observations: 43

Root Mean Squared Error	1264.687
Mean Absolute Error	728.8004
Mean Abs. Percent Error	19892.13
Theil Inequality Coefficient	0.085983
Bias Proportion	0.000000
Variance Proportion	0.001634
Covariance Proportion	0.998366

ملحق رقم (9)
نتائج تقدير دالة الطلب على النقود باستخدام الصيغ المختلفة للدوال (التربيعية ، التكعيبية ' الخطية ، النصف لوغريثمية)

تقديرالدالة النصف لوغريثمية للطلب على النقود :

Dependent Variable: LOG(MD)
Method: Least Squares
Date: 10/22/14 Time: 23:17
Sample(adjusted): 1971 2013
Included observations: 43 after adjusting endpoints

Prob.	t-Statistic	Std. Error	Coefficient	Variable
0.1701	-1.398540	0.592700	-0.828915	C
0.0024	3.253041	0.044961	0.146261	CF
0.6119	0.511605	0.012405	0.006346	INF
0.5690	0.574486	9.03E-06	5.19E-06	GDP
0.0000	5.445036	0.472634	2.573511	ER
4.701223	Mean dependent var		0.848429	R-squared
4.405908	S.D. dependent var		0.832474	Adjusted R-squared
4.126097	Akaike info criterion		1.803335	S.E. of regression
4.330887	Schwarz criterion		123.5767	Sum squared resid
53.17686	F-statistic		-83.71108	Log likelihood
0.000000	Prob(F-statistic)		0.393004	Durbin-Watson stat

تقديرالدالة النصف لوغريثمية للطلب على النقود بعد استبعاد متغير سعر الصرف :

Dependent Variable: LOG(MD)
Method: Least Squares
Date: 10/22/14 Time: 23:19
Sample(adjusted): 1971 2013
Included observations: 43 after adjusting endpoints

Prob.	t-Statistic	Std. Error	Coefficient	Variable
0.5044	-0.673884	0.777106	-0.523679	C
0.0000	5.461881	0.050359	0.275055	CF
0.0461	-2.060191	0.013958	-0.028757	INF
0.0000	9.073408	5.40E-06	4.90E-05	GDP
4.701223	Mean dependent var		0.730170	R-squared
4.405908	S.D. dependent var		0.709414	Adjusted R-squared
4.656323	Akaike info criterion		2.375051	S.E. of regression
4.820155	Schwarz criterion		219.9938	Sum squared resid
35.17847	F-statistic		-96.11094	Log likelihood
0.000000	Prob(F-statistic)		0.435572	Durbin-Watson stat

تابع ملحق رقم (9)

تقديرالدالة التربيعية للطلب على النقود :

Dependent Variable: MD
Method: Least Squares
Date: 10/25/14 Time: 03:17
Sample(adjusted): 1971 2013
Included observations: 43 after adjusting endpoints

Prob.	t-Statistic	Std. Error	Coefficient	Variable
0.0324	2.221489	1028.828	2285.531	C
0.3827	-0.883226	2.094257	-1.849701	CF*CF
0.7001	-0.388144	0.190080	-0.073778	INF*INF
0.0000	7.603513	9.07E-08	6.90E-07	GDP*GDP
0.0202	2.424593	288.5982	699.7334	ER*ER

8011.333	Mean dependent var	0.930561	R-squared
15852.28	S.D. dependent var	0.923252	Adjusted R-squared
19.72173	Akaike info criterion	4391.633	S.E. of regression
19.92652	Schwarz criterion	7.33E+08	Sum squared resid
127.3109	F-statistic	-419.0173	Log likelihood
0.000000	Prob(F-statistic)	0.360957	Durbin-Watson stat

تقديرالدالة التكعيبية للطلب على النقود :

Dependent Variable: MD
Method: Least Squares
Date: 10/25/14 Time: 03:19
Sample(adjusted): 1971 2013
Included observations: 43 after adjusting endpoints

Prob.	t-Statistic	Std. Error	Coefficient	Variable
0.0147	2.555751	1427.048	3647.179	C
0.3517	-0.942804	0.079701	-0.075142	CF*CF*CF
0.6365	-0.476442	0.002193	-0.001045	INF*INF*INF
0.0230	2.370201	6.33E-13	1.50E-12	GDP*GDP*GDP
0.0122	2.633075	122.3941	322.2729	ER*ER*ER

8011.333	Mean dependent var	0.825533	R-squared
15852.28	S.D. dependent var	0.807169	Adjusted R-squared
20.64302	Akaike info criterion	6961.146	S.E. of regression
20.84781	Schwarz criterion	1.84E+09	Sum squared resid
44.95169	F-statistic	-438.8249	Log likelihood
0.000000	Prob(F-statistic)	0.275261	Durbin-Watson stat

تابع ملحق رقم (9)

Dependent Variable: MD
Method: Least Squares
Date: 10/25/14 Time: 03:23
Sample(adjusted): 1972 2013
Included observations: 42 after adjusting endpoints
Convergence achieved after 9 iterations

Prob.	t-Statistic	Std. Error	Coefficient	Variable
0.0482	-2.042907	29.62260	-60.51623	CF
0.0948	1.714316	9.367150	16.05826	INF
0.0000	29.07057	0.008200	0.238379	GDP
0.0585	-1.952551	416.1913	-812.6348	ER
0.0387	2.143079	0.163365	0.350104	AR(1)
8202.076	Mean dependent var		0.994025	R-squared
15994.42	S.D. dependent var		0.993380	Adjusted R-squared
17.29162	Akaike info criterion		1301.402	S.E. of regression
17.49848	Schwarz criterion		62664946	Sum squared resid
1.864775	Durbin-Watson stat		-358.1239	Log likelihood
.35				Inverted AR Roots

نتائج تقدير الدالة الخطية للطلب على النقود في السودان

Dependent Variable: MD
Method: Least Squares
Date: 08/08/14 Time: 06:27
Sample(adjusted): 1971 2013
Included observations: 43 after adjusting endpoints

Prob.	t-Statistic	Std. Error	Coefficient	Variable
0.7091	-0.375910	442.1647	-166.2141	C
0.0000	36.03061	0.006733	0.242603	GDP
0.0235	2.360685	9.254337	21.84658	INF
0.0589	-1.947310	33.54205	-65.31677	CF
0.0082	-2.790524	352.5936	-983.9208	ER
8011.333	Mean dependent var		0.993484	R-squared
15852.28	S.D. dependent var		0.992798	Adjusted R-squared
17.35560	Akaike info criterion		1345.320	S.E. of regression
17.56039	Schwarz criterion		68775652	Sum squared resid
1448.380	F-statistic		-368.1453	Log likelihood
0.000000	Prob(F-statistic)		1.443476	Durbin-Watson stat