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Using the autoregressive distributed lag (ARDL) methodology in estimating the relationship between the exchange rate and the balance of payments in Sudan ("an econometric study for the period 2000-2022").

prepared by

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Abstract

The study aimed to clarify the importance of the exchange rate as an indicator that reflects the economic situation analyze the relationship between it and the balance of payments , and formulate a standard model for analyzing the exchange rate policy and the balance of payments in sudan , in light of the severity of the financial problems in sudan during period 2000-2022.

Is there balanced relationship between the exchange rate and balance of payments in sudan during period 2000-2022? The study used the analytical descriptive approach and secondary sources ,and used the quantitative approach to build a standard model to measure the effect of the exchange rate as on the factors affecting the balance of payments , by testing the casual relationship between the two variables , and the one of the most important results of the study is the existence of a long-term equilibrium relationship, and the percentage of term errors the short- term ,which can be corrected per unit of time in order to return to the long – term equilibrium meaning that the rate of (-0.48) of the imbalance in the balance of payments is corrected during the year in order to return to the long – term equilibrium.

Keywords :exchange rate - balance of payments – auto regressive distributed lag.

Table (1) shows the exchange rate changes in Sudan during the period 2000-2010

العام	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
سعر الصرف	2،614	2،167	2،602	2،500	2،40	2،43	2،17	2،0107	2،086	2،280	2،317

Table (2) shows the exchange rate changes in Sudan during the period 2011-2022

العام	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
سعر الصرف	2،48	3،56	4،74	5،75	6،01	6،18	6،67	24،34	45	55	580	586

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Table (3) shows changes in the balance of payments in Sudan during the period 2000-2010

العام / البند	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
الحساب الجاري	540،2	1284،9	962،7	938،6	818،2	2769،1	4722،1	3268،1	3476،0	4926،0	254،8
الحساب الرأسمالي	299،7	490،5	842،0	1389،8	1353،9	2427،2	4611،1	4268،0	2659،5	4747،3	610،2
الأخطاء والمحذوفات	240،5	794،5	420،7	28،6	730،2	872،5	97،9	1281،9	876،6	356،4	919،2
الاحتياطي الأجنبي	108،0	127،6	300،0	422،6	(730،2)	530،5	208،6	282،1	21،1	555،7	54،2

Table (4) shows changes in the balance of payments in Sudan during the period 2011-2022

2022	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	العام / البند
1،226	2،504	(،2،347)	،5،212	(4،928)	(4,851)	(,4,127)	(,5,460)	(,4,849)	(5,397)	(6,563,3	14302	الحساب الجاري
30،5	103،3	742،2	3،095	3،112	3،548	3،517	5،375	3،467	3،819	4،252،7	948،5	الحساب الرأسمالي
83	1،215	1،653	2،129	1،790	1،290	590،9	123،4	1،365	1،560	2،310	21،736	الأخطاء والمحذوفات
179،7	1،108	29،7	12،4	25،2	12،8	18،7	38،4	15،1	17،6	04	644،5	الاحتياطي الأجنبي

Chart (1) shows the development of the study variables (contemplative view)

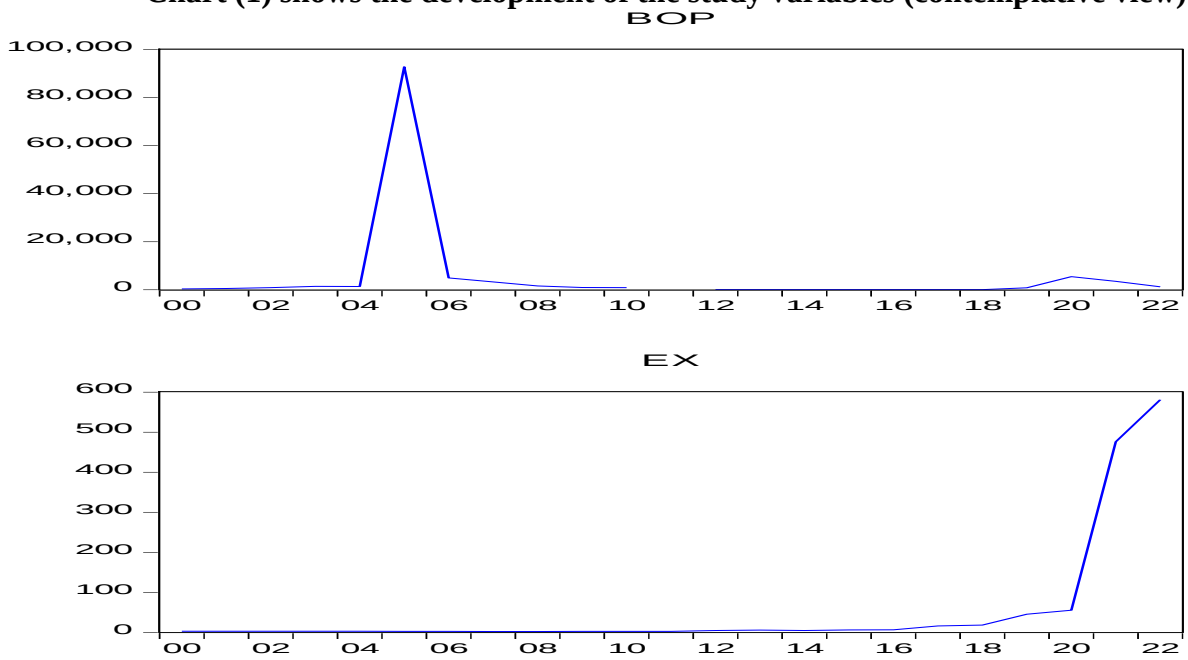


Table No. (6) shows the selection of appropriate slowdown periods

Dependent Variable: log(Bop)
Method: ARDL
Date: 07/06/23 Time: 08:05
Sample (adjusted): 2002 2022
Included observations: 21 after adjustments

Maximum dependent lags: 4 (Automatic selection)				
Model selection method: Akaike info criterion (AIC)				
Dynamic regressors (4 lags, automatic): LOG(EX)				
Fixed regressors:				
Number of models evalulated: 20				
Selected Model: ARDL(1, 2)				
Note: final equation sample is larger than selection sample				
Variable	**Coefficien**	**Std. Error**	**t-Statistic**	**Prob**
LOG(BOP(−1))	0.723340	0.101109	7.154097	0.0000
LOG(EX)	−2.080733	1.105526	−1.882120	0.0771
LOG(EX(−1))	−0.828074	1.031324	−0.802924	0.4331
LOG(EX(−2))	4.869608	1.679526	2.899394	0.0100
Mean dependent var =6.15			R^2 =0.62	
S.D. dependent var =2.56			R^{-2} =0.55	
Akaike info criterion =4.09			S.E. =1.72	
Schwarz criterion =4.29			Sum sq =50.31	
Hannan-Quinn criter = 4.14			D-W = 2.46	

Figure (2) shows the selection of the best model for the study, which is ARDL(2,1).

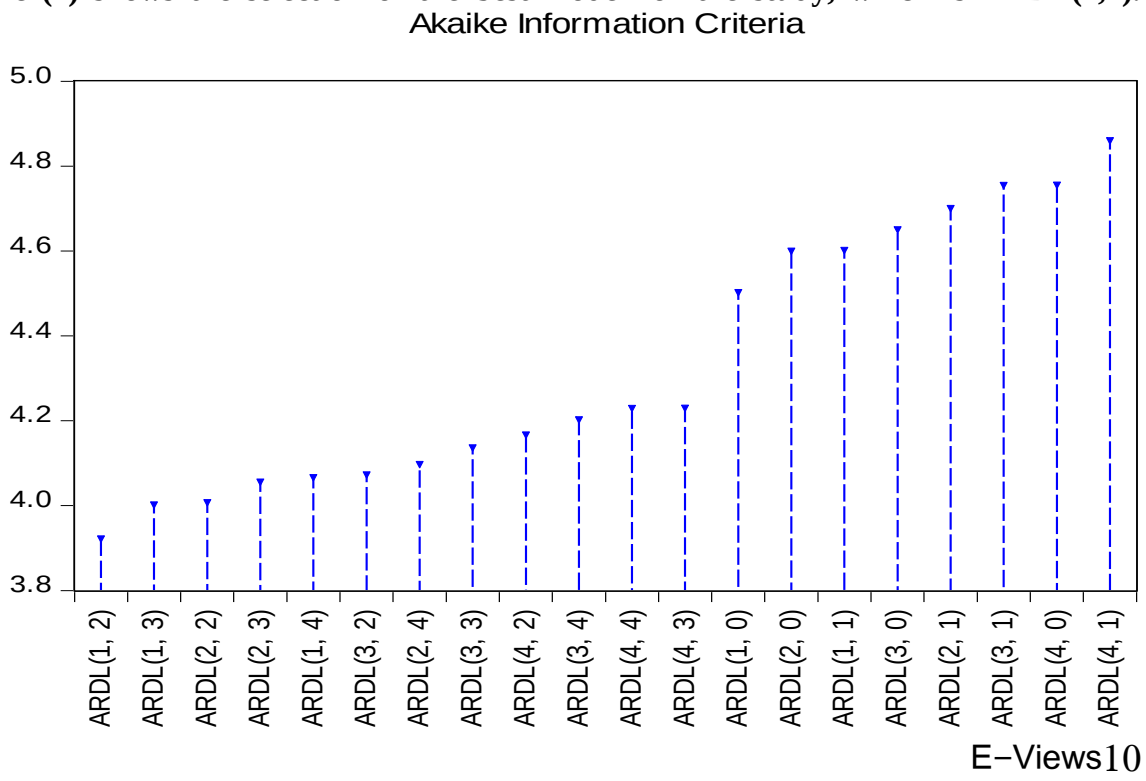


Table (7) shows the Bounds Test for cointegration

F-Bounds Test:اختبار الحدود لمتغيرات الدراسة				
Test Statistic	Value	Signif	I(0)	I(1)
F-statistic	4.83	10%	2.44	3.28
K	1	5%	3.15	4.11
–	–	2.5%	3.88	4.92
–	–	1%	4.81	6.02

Table (8) shows the results of the white test

F-statistic	0.44	Prob. F(10,10)	0.89
Obs*R-squared	6.46	Prob. Chi-square	0.77

E-Views10

Table (9) shows the results of the serial correlation test for the residuals

F-statistic	0.33	Prob. F(4,16)	0..86
Obs*R-squared	1.58	Prob. Chi-square	0.78

Figure (3) shows the normal distribution

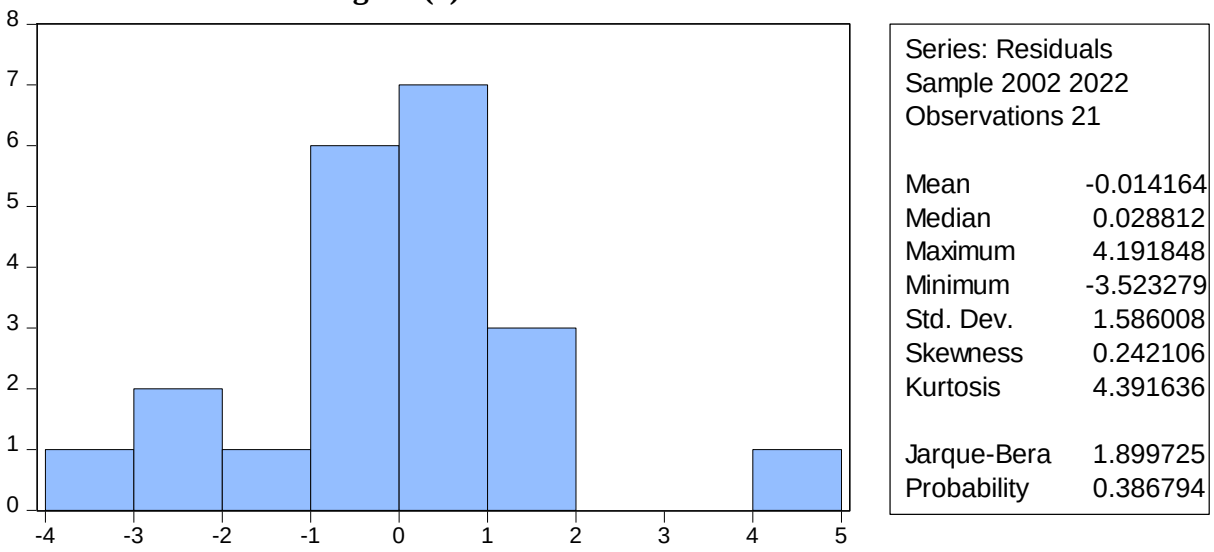
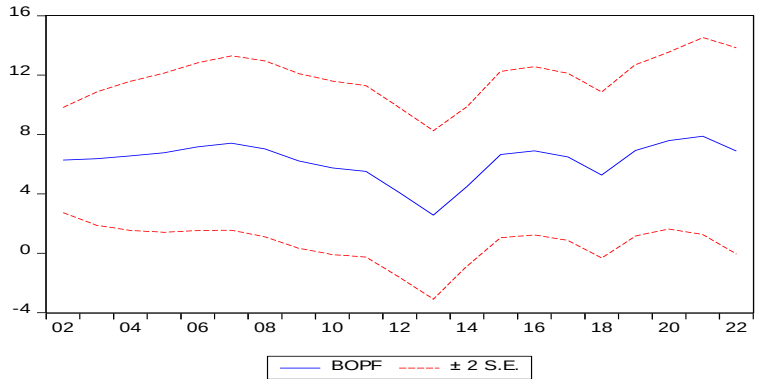


Table (10) shows the results of the error correction model

pro(t-test القيمةالاحتمالية statistic)	T المحسوبة	الخطأ المعياري	المعالم	المتغيرات
0.0107	2.912691	2.092129	6.093725	C
0.9523	0.060810	0.053754	0.003269	EX(−2)
0.0004	−4.571804	0.105867	−0.484003	CointEq(−1)
0.0001	5.376036	0.148598	0.798869	AR(1)
0.0356	2.309546	0.911701	2.105616	SIGMASQ
Durbin−Watson stat=1.40		Adjusted R−squared=0.58		
Prob(F−statistic)=0.000165		F−statistic=7.429153		

Figure (4) shows the model's ability to forecast



Forecast: BOPF
Actual: LOG(BOP)
Forecast sample: 2000 2022
Adjusted sample: 2002 2022
Included observations: 21

Root Mean Squared Error	1.933089
Mean Absolute Error	1.456437
Mean Abs. Percent Error	39.87250
Theil Inequality Coefficient	0.148852
Bias Proportion	0.001689
Variance Proportion	0.422880
Covariance Proportion	0.575431
Theil U2 Coefficient	1.104463
Symmetric MAPE	27.86003

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