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The Effectiveness of Stabilization and Structural Adjustment Programs in Sudan

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Introduction

The 'Bretton Woods' twins, the World Bank and the International Monetary Fund, began their stabilization and structural adjustment policies purported to help highly indebted developing countries cope with debt servicing in the face of their serious balance of payments crises in the early 1980s. It was expected that the intervention of these international institutions whereby appropriate policies with the help of external aid flows, would permit countries to restore growth and to tackle long term development problems (Sinha, 1995).

Structural adjustment policies (encompass both stabilization and structural adjustment policies) adopted by Sudan as reform packages were aimed at rectifying macroeconomic imbalances and restoring sustainable economic growth.

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They included relatively short-term stabilization policies, which have the specific goal of reducing invariable fiscal and balance of payments deficits as well as long term policies that address the more fundamental distortions underlying macroeconomic imbalances, such as policies to improve resource allocation, increase economic efficiency, expand growth potential and increase resilience to shocks. Crucial to the success of a program of economic reform and structural adjustment was the maintenance of macroeconomic stability. Therefore, stabilization needed to be followed by a concerted adjustment program to tackle the underlying structural problems.

The so called stabilization and structural adjustment programs include measures such as credit ceilings, and control of money supply, exchange rate adjustment, mainly devaluation, interest rate policy, fiscal policy and trade and payments liberalization which were put in place to stabilize the inherent economic problems such as inflation and balance of payments deficit, and to adjust the economy to the long run growth path.

The stabilization and adjustment period in Sudan from 1977/1978 to 1984/1985, was one of the very abysmal economic performances. The economic situation, however, continued to deteriorate despite these policy measures. The various facets of this economic decline were amply documented. GDP per capita fell from US\$ 483 to US\$ 340; gross national saving plunged down to below zero. The government deficit tripled, reaching 15 percent of GDP on the average between 1984 - 1985 and development expenditure as percentage of GDP dropped by 50 percent. The growth in money supply increased from 23 percent of GDP to 35 percent, giving rise to an annual inflation in excess of 30 percent over the same period. The government overall balance, which had been positive in 1970 - 1971, turned into a deficit of 5 percent of GDP in 1977-1978. The situation with regard to the external sector is equally bad. Foreign debt increased from US\$ 337.0 million in 1970 -1971 to nearly US\$ 2.0 billion by the end of 1978 (Hassan, 1997). In 1992/93 Sudan debt service was about US\$15.0 million, with arrears estimated at US\$ 8.4 billion and reached US\$ 22.4 billion in 1998 (IMF, 1999).

It is believed that the reform strategy in Sudan failed to tap the impulses for equitable and accelerated economic growth existing in the structure of the economy and the benefit in terms of reducing balance of payments deficits, inflation and increasing investment. In addition, it is argued that stabilization programs sometimes resulted in stagnation, and macroeconomic disequilibrium, and also frustrated growth, and led to a decline in investment and per capita income.

General outcome of the evidence surveyed so far throws doubt on the ability of Fund programs to bring countries to balance of payments viability, promote liberalisation, and reduce inflation (Killick, 1986). It has also casted doubt upon the alleged tendency for the Fund programs to result in serious losses of output and employment.

There is almost unanimous agreement that stabilization and structural adjustment programs failed to attain their objectives in Sudan during the 1980s and early 1990s (Awad, 1983, Hussein and Thirlwall, 1984, Hag Elmain, 1990, Hag Elmain, 1995, and Hassan, 1997). Disagreement exists among economists over the causes of this failure. Firstly, some analysts related failure of these programs to inappropriate policy design, or simply because the scale of the problem defies any quick solution. Secondly, the failure could also be due to exogenous factors such as drought, civil war, political instability and domestic disruptions (Hag Elamin and Elmak, 1995). Third, governments are often able to delay or avoid implementation, so poor performance may actually be the outcome of the failure to act on their policies rather than to the policies themselves (Brett, 1995). The empirical works on the impact of stabilization and adjustment programs are inconclusive. Therefore, the focus of this study is on the empirical evaluation of the impacts of these structural adjustment programs on macroeconomic variables in Sudan

Sudan is taken as a representative case for SSA. Sudan was one of the earliest countries to adopt the stabilization and structural adjustment programs as a major instrument of reform-in 1978, and these adjustments dominated the country's economic policy until 1989 when the accumulation of arrears led Sudan to effectively default on its international

obligations. Second, the structure of the Sudan economy is similar to that of other African countries where domestic production depends heavily on imported capital while the main source of foreign currency is from the exports of primary goods. Finally, as one of SSA countries, Sudan is also one of the earliest defaulters on public external debt.

Substantial amount of research has empirically documented the importance of this issue. In a series of papers, for example, Mosely (1994) argued that despite this limited causal conclusions, adjustments still possible. Most studies found that structural reforms remain incomplete and external viability elusive at least for the near term (IMF, 1993). On the whole, the impact of structural adjustment programs, in most cases, has been positive on the exports and external account but negative on investment (Mosely, Harrigan and Toye 1991).

While Englebert and Hoffman (1994) studied the impact of structural adjustment programs on Burundi they concluded that the effects of these programs were mixed. Also, Hag Elmain and Elmak (1995) attempted to measure and compare the impact of the two main stabilization and structural adjustment programs on agriculture price incentives implemented over the period 1978 - 93 in Sudan. Their results showed that these programs do not seem to be successful in terms of timing exchange rates. They concluded that given the fiscal constraint that usually face the government during adjustment programs, it would be extremely difficult to avoid the short run negative impact of reduced public inputs.

In short, there is lack of an adequate quantitative methodology for assessing the impact of stabilization and adjustment reforms. Moreover, what studies do exist come to conflicting conclusions. Therefore, it is difficult for the policy makers in Sudan to decide whether to continue with the existing reforms and whether to change them in a particular direction. By designing a study that is methodologically more suitable than those found in the existing literature, we hope that this study will

contribute better to policy makers to make more informed decisions on these crucial issues.

Methodology

The Model

There is an abundant theoretical literature on the determinants of saving, investment and growth. For example, Warman and Thirlwall (1994) analyzed the interrelationship between real interest rates, savings, investment and growth in Mexico over the period 1960 -1990. They concluded that any effect of financial liberalization and higher real interest rates on economic growth must come through raising the productivity of investment. They reported that there is no evidence that high real interest rates lead to higher total saving, investment and economic growth, but only it affects favorably financial saving. Their findings support the Mckinnon-Shaw (1973) results.

Paxson (1996) investigated the links between saving and growth in four countries (US, Britain, Taiwan and Thailand) by estimating the life cycle and habit formation models. The results indicated that increases in rates of economic growth would have only small effects on aggregate saving rates.

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Shafik (1992) investigated the determinants of investment in Egypt. She used an error correction model to analyse the data in 1960-1986. Some of the standard models of investment (accelerator, flexible accelerator, neo-classical, putty- clay, partial adjustment, and profits

model) were estimated. She mentioned that the determinants of the private investment depend on mark-ups, which is a ratio of the wholesale price index to an index of wages in the economy, internal financing, demand and cost of investment goods. Her study claimed that the evidence on the complementary relationship between public and private investment is mixed.

Ghura (1997) investigated empirically the factors that have influenced economic growth in Cameroon during 1963 -96. The results of his study supported the endogenous growth type model. His findings also supported Ghura and Hadjimichael (1996) for Sub-Sahara African countries, and Khan and Kumar (1993) and Khan and Reinhart (1990) for a diverse group of developing economies results, that the increase in the ratio of private investment to real GDP was positive and significant on economic growth.

Savings

For the empirical investigation the saving equation takes the following form:

$$SAV = \beta_0 + \beta_1 GR + \beta_2 ODA + \beta_3 TAX + \beta_4 DEP + \beta_5 FD + \beta_6 IRT + \beta_7 SA + \varepsilon \quad (1)$$

where

- β 's = parameters to be estimated
- SAV = domestic saving to GDP ratio
- GR = per capita economic growth rate
- ODA = overseas development assistance
- TAX = taxes
- DEP = dependency
- FD = financial deepening
- IRT = interest rate
- TAX = taxes
- SA = dummy variable to capture the effects of structural and institutional reforms
- ε = Stochastic error term.

Investment

The empirical specification for investment is as follows:

$$INV = \alpha_0 + \alpha_1 SAV + \alpha_2 REER + \alpha_3 BM + \alpha_4 BD + \alpha_5 ODA + \alpha_6 IRT + \alpha_7 SA + \varepsilon \quad (2)$$

where

α 's are parameters to be estimated

INV = Investment as ratio to GDP

BM = broad money

REER = real exchange rate

SAV, ODA, IRT, REER, SA and ε are as defined before.

Growth Rate

The growth equation used for the analysis of the impact of structural adjustment on economic growth is specified as follows:

$$GR = \eta_1 \ln INV + \eta_2 \ln (PG + g + \delta) + \eta_3 \ln HK + \theta_1 INF + \theta_2 BD + \theta_3 VX + \theta_4 SA + \varepsilon \quad (3)$$

where

GR = the per capita real GDP growth rate

INV = investment as ratio to GDP

PG = the rate of population growth

g = the rate technical progress

δ = depreciation

HK = an indicator of human capital development

INF = rate of inflation

VX = volume of export index

SA, and ε are as defined before.

Estimation Technique and Data

Cointegration

The concept of cointegration was introduced by Granger (1981) and is used in econometrics to discuss long run economic relations. A necessary condition for the existence of cointegration is that all the variables must be integrated of the same order. Therefore standard unit root is applied to the series to ensure that they exhibit the same order of integration. Existence of unit root in a series indicates its non-stationary

property. If the series are integrated of the same order, then we proceed from unit root test to cointegration test. In this study we employ Johansen (1988) and Johansen and Juselius (1990) procedures to test for the cointegration relationship. We use Johansen's procedure because it allows for different degrees of integration and is better designed to estimate several cointegration vectors.

According to this technique. If two variables are cointegrated (i.e. they share a common trend) the finding of no causality in either direction is ruled out. Although cointegration indicates presence or absence of Granger causality, it does not indicate the direction of causality between variables. This direction of the Granger causality can only be detected through the vector error correction model (VECM) derived from the long run cointegration vector. The F-test of the difference explanatory variables gives an indication of the short-term causal effects. On the other hand, the long run causal relationship is implied through the significance or otherwise of the t-tests of the lagged error correction terms which contain the long term information since they are derived from long run cointegration relationships.

The Data

The data were obtained from various issues of the International Financial Statistics, World Development Indicators, and Ministry of Finance, Bank of Sudan and Department of Statistics.

Inflation was measured by the annual change in consumer price index (CPI).

Data on interest rate from 1960-1984 is obtained from the Ministry of Finance in Sudan. However, the observation from 1985-1998 corresponded to the Islamic interest rate (i.e. calculated from the average of Murabaha and Musharaka).

The real effective Exchange rate (REER) was measured by the ratio of average World CPI index over domestic consumer price index. The World consumer price index was the weighted average of the CPI in the

main trading partners and competitiveness of the home country.

The money supply was measured by the broad money as a ratio to GDP was chosen to represent financial deepening. Human capital was proxied by secondary school enrolment. The time trend variable represented exogenous technical progress.

The sample period is from 1955 and 1998 and all the variables except for interest rate were in logarithmic forms so that the difference gives us the growth rate.

We employ annual rather than quarterly data because some data, for example real GDP were available only annual basis. However, as Shiller and Peron (1985) argued strongly that when analysing the long-run characteristics of economic time series, the length of the time series is more important than the frequency of observation.

Results and Discussions

The pre-requisite of cointegration is that all variables must integrate to same order. Therefore, unit root test was used to check for the order of integration. We applied the standard Augmented Dickey Fuller (ADF) and Philips-Perron (PP) tests. The results of the unit root test on the level and its difference of the series are given in Table 1. The results indicate all variables are stationary in their first difference.

Table 1: Unit Root Test Results

Variable	Augmented Dickey-Fuller (ADF)				Phillips-Peron (PP)			
	level		1st difference		level		1st difference	
	No trend	trend	No trend	trend	No trend	trend	No trend	trend
SAV	-2.18241	-2.54178	-8.86013	-8.68252	-3.32181	-4.11828	-13.4441	-13.2087
INV	-0.30677	-2.51254	-5.18335	-5.2113	-0.63434	-2.89201	-10.8396	-12.0603
GR	-0.27281	-1.0125	-4.53117	-4.71266	-0.87789	-2.80678	-9.9624	-10.0653
INF	-2.05372	-2.76244	-6.24102	-6.19833	-3.04532	-3.3512	-10.2717	-10.2112
IRT	-0.30677	-2.51254	-5.18335	-5.2115	-0.63434	-2.89201	-10.8396	-10.2119
TAX	0.475272	-0.21877	-3.04499	-3.72633	0.554586	-0.19252	-5.51694	-6.42957
FD	-2.27983	-1.61607	-4.8067	-5.3835	-2.32813	-1.63719	-5.27459	-5.54884
ODA	2.382513	-0.42923	-3.49145	-4.6442	1.575263	-1.25686	-9.2594	-11.6748
VX	-3.40095	-3.37685	-4.64383	-4.57883	-5.92067	-5.83961	-36.2154	-58.1045
PG	-2.03972	-2.16002	-2.16002	-6.69435	-2.9331	-2.98018	-10.5456	-10.9411
BD	-2.03954	-1.56546	-5.40576	-5.8413	-2.86859	-2.52871	-11.0331	-11.6985
DEP	1.521842	-0.29543	-4.76114	-5.74458	1.92278	-0.39379	-6.50393	-7.49481
HK	-1.41786	-2.82827	-5.65892	-4.99987	-1.5667	-2.96205	-7.0571	-6.97541
BM	-2.46621	-1.84863	-4.57347	-5.06343	-2.62834	-1.81209	-6.33606	-6.76621
BD*	-2.46621	-1.64863	-4.57347	-5.06343	-2.62834	-1.81269	-6.33606	-6.7662
REER	-2.77639	-3.31976	-5.47488	5.401164	-2.71586	-3.11946	-3.56184	-5.4831

The denotation: SAV= domestic saving; INV= domestic investment; GR= per capita economic growth rate; INF= inflation; IRT= interest rate; TAX= taxes; FD= financial deepening; ODA= overseas development assistance; VX= volume of export index; PG= population growth rate; BD= budget deficit (excluding grants); DEP= dependency ratio; HK= human capital; BM= money supply; BD*= budget deficit (including grants); RER= real effective exchange rate.

Cointegration Test

The results of Johansen -Juselius multivariate cointegration are reported in Tables 2 to 4. The results suggested that variables in the three models were cointegrated with only one cointegration vector. The null hypothesis of no cointegration ($r=0$) is easily rejected at 5 percent significance level. Both λ -max and trace statistics support this result. Thus the results confirmed the existence of long run relationships among the variables included in each of the model specification.

The estimates of long run equation from normalizing cointegrated vectors on saving, investment and growth model are presented in Table 5 to 7 respectively and the numbers below the estimated parameters are the asymptotic standard errors.

Table 2: Johansen and Juselius's Test for Multiple Cointegration Vectors

Variables	SAV	GR	ODA	TAX	DEP	FD	IRT
VAR Lag is 2							
Tests		C. V.s		Critical values		C.V.s*** Critical Values	
Ho	Ha	C. V.		95%		95%	
r=0	r=1	81.8627***		45.6300**		174.5984*** 124.6200**	
r=1	r=2	37.6879		39.8300		92.7357 95.8700	
r<=2	r=3	22.5820		33.6400		55.0478 70.4900	
r<=3	r=4	17.2248		27.4200		32.4657 48.8800	
r<=4	r=5	10.3826		21.1200		15.2409 31.5400	
r<=5	r=6	4.8582		14.8800		4.8584 17.8600	
r<=6	r=7	0.000192		8.0700		0.0001924 8.0700	

Note: 1. These statistics are computed with a constant in the unrestricted VAR equation

** refer to 95% significance level.

2. Asterisks *** refer to the cointegration vectors.

3. r indicates the number of cointegration vectors.

Table 3: Johansen Cointegration Test for Investment Model

Tests		INV SAV REER BM BD ODA IRT			
		λ-max		λ-trace	
		C.V.s	Critical Values 95%	C.V.s	Critical values 95%
Ho	Ha				
r=0	r=1	78.7784***	45.6300**	155.6690***	124.6200
r<=1	r=2	34.9288	39.8300	92.9511	92.9511
r<=2	r=3	32.566	33.6400	61.6414	70.4900
r<=3	r=4	18.5771	27.4200	34.0620	48.8800
r<=4	r=5	10.4325	21.1200	15.4850	31.5400
r<=5	r=6	9.11972	14.8800	7.4026	17.8600
r<=6	r=7	0.11972	8.0700	.0051339	8.0700

Note: 1. These statistics are computed with a constant in the unrestricted VAR equation **

refer to 95% significance level.

2. Asterisks *** refer to the cointegration vectors.

3. r indicates the number of cointegration vectors.

Table 4: Johansen Cointegration Test for Growth Model

Variables: GR PG HK BD VX INF					
VAR lag is 2					
Tests		λ -max	Critical Values 95%	λ -trace	Critical values 95%
		C.V.s		C.V.s	
Ho	Ha				
$r=0$	$r=1$	61.9829***	45.6300**	154.8065***	124.6200**
$r \leq 1$	$r=2$	29.7924	39.8300	92.8236	95.8700
$r \leq 2$	$r=3$	25.9900	33.6400	63.0312	70.4900
$r \leq 3$	$r=4$	19.8967	27.4200	37.0412	48.8800
$r \leq 4$	$r=5$	9.7270	21.1200	17.1445	31.5400
$r \leq 5$	$r=6$	7.2501	14.8800	7.4175	17.8600
$r \leq 6$	$r=7$	0.16744	8.0700	0.16744	8.0700

Note : 1. These statistics are computed with a constant in the unrestricted VAR equation
 2. ** refer to 95% significance level and asterisks *** refer to the cointegration vectors.
 3. r indicates the number of cointegration vectors.

Table 5 suggested that growth rate, tax and financial deepening contributed positively to the saving. Dependency ratio, overseas development assistance and interest rate contribute negatively to the saving function.

However, the estimated long run investment equation reported in Table 6 reveals that exchange rate, domestic saving, interest rate and money supply have a positive influence on investment. The slope parameters are significant at 5 percent level or better. Budget deficit and overseas development assistance contributed negatively to domestic investment.

Table 7 suggests that for the growth rate equation, domestic investment, human capital and volume of export index could affect growth rate positively at 1 percent significance level. Budget deficit, population growth rate and inflation have negative influences on the growth rate at 5 percent level and better.

Table 5: Estimated Cointegration Equation for Saving Model

Variables	Coefficient	t-statistics	Sig. Level
GR	0.11274	3.6603	1 %
ODA	-0.28727	1.9995	10 %
TAX	1.1175	4.84311	1%
DEP	-2.3074	1.74005	10 %
FD	1.3012	0.203557	20 %
IRT	-7.0077	1.6679	10 %
Constant	-4.5775	2.4141	5 %

Note: 1. The estimated coefficients are obtained by normalizing.

2. Numbers in parentheses are standard errors.

Table 6: Estimated Cointegration Equation for Investment

variables	Coefficient	t-statistics	Sig. level
SAV	1.5018	1.99934	10 %
REER	4.9850	2.57996	1 %
BM	1.9815	2.79422	1 %
BD	-7.8883	1.94743	10 %
ODA	-0.51962	2.13002	5 %
IRT	33.2514	3.72181	1%
Constant	-4.5775	4.5775	1%

Note: 1. The estimate coefficients are obtained by normalising.

2. Numbers in parentheses are standard errors.

Table 7: Estimated Cointegration Equation for Growth

Variables	Coefficient	t-statistics	Sig. level
INV	2.0342	7.4433	1%
PG	-3.2870	2.1301	5%
HK	8.86876	2.97677	1%
BD	-6.3473	2.1750	5%
VX	6.1924	2.2230	5%
INF	-73.2490	2.58144	1 %
Constant	-58.853	3.9011	1%

Note: 1. The estimated coefficients are obtained by normalising.

2. Numbers in parentheses are standard errors

Temporal Causality Based on Vector Error Correction Model (VECM)

In this study we investigated the causality direction among the variables in each model. The error correction model allows us to investigate the issue of temporal causality. The existence of error representation implies that changes in the dependent variables are a function of the level of disequilibrium in the cointegration relationship captured by the error correction term as well as changes in other explanatory variables. The results of the temporal causality tests based on the VECM for the saving equation are reported in Table 8.

The F-test from Table 8 suggest that for saving equation, output growth rate, interest rate and structural and institutional reforms could affect

Table 8: Temporal Causality Results Based on Vector Error Correction Model

Dep. Var.	Δ SAV	Δ GR	Δ ODA	Δ TAX	Δ DEP	Δ FD	Δ IRT	SA	ECT
F-statistics									t-statistics
Δ SAV	-	5.7790 (0.016)	1.7051 (0.192)	0.25122 (0.1616)	0.45057 (0.502)	0.45057 (0.502)	10.000 (0.0001)	6.2454 (0.012)*	-3.328
Δ GR	2.8947 (0.089)*	-	0.30829 (0.579)	6.3654 (0.012)*	24.6094 (0.000)***	0.00828 (0.9972)		0.29306 (0.588)	-1.5056
Δ ODA	0.02547 (0.873)	0.009181 (0.924)	-	0.10160 (0.750)	0.69905 (0.403)	0.99723 (0.318)		0.00083 (0.977)	0.231132
Δ TAX	1.1495 (0.284)	0.42120 (0.516)	0.21920 (0.640)	1.3239 (0.250)	0.002398 (0.961)	-		1.2318 (0.267)	-2.8339
Δ DEP	0.00259 (0.959)	0.00718 (0.923)	5.1154 (0.024)	0.21130 (0.646)	-	0.26495 (0.607)	0.1308 (0.718)	2.9032 (0.088)	0.59826
Δ FD	8.5339 (0.003)**	0.6167 (0.432)	0.21130 (0.646)	1.0317 (0.310)	1.2390 (0.260)	-	3.4776 (0.062)	1.03	-1.8168
Δ IRT	2.6557 (0.103)	5.3554 (0.021)	7.200 (0.007)	9.7947 (0.0002)***	2.0264 (0.165)	2.5305 (0.112)	-	1.6393 (0.200)	-3.3204

Note: 1) Numbers not in parentheses are the joint coefficient of the corresponding variable and its lag.

2) Numbers in parentheses are refer to the F test significance level

3) ***, ** and * indicate significance at the 1, 5 and 10 per cent levels

saving at 5 percent significance level or better in the short run. Feedback occurs among saving with growth rate and saving with interest rate.

In addition the results from Table 8 reveal that bi-directional causality occurs between overseas development assistance and dependency ratio while unidirectional causation run from financial deepening to growth and interest rate. This result supports evidence for a long run causal connection between measures of financial intermediation and economic growth (Rousseau and Wachtel, 1998). Furthermore, the results from Table 8 suggest that structural and institutional reforms influenced tax at 1 percent level of significance.

Table 9: Temporal Causality Results Based on Vector Error Correction Model for Investment

cp. ar.	Δ INV	Δ SAV	Δ REER	Δ BM	Δ BD	Δ ODA	Δ IRT	SA	ECT
F-statistics									t- statistics
INV	-	3.1865 (0.074)*	8.2762 (0.004)***	5.3612 (0.021)*	9.8206 (0.002)***	0.25087 (0.616)	1.1237 (0.837)	13.2676 (0.000)***	-5.0388 (0.000)
SAV	0.11616 (0.722)	-	3.8829 (0.049)*	2.6531 (0.103)*	0.18802 (0.665)	0.0422 (0.837)	0.02576 (0.612)	1.4316 (0.232)	1.0215 (0.316)
REER	0.12616 (0.722)	0.0076 (0.978)	-	5.1593 (0.023)*	0.89446 (0.344)	0.94675 (0.332)	0.89446 (0.332)	16.4143 (0.000)***	4.8799 (0.002)* *
BM	0.85782 (0.354)	8.6763 (0.003)	31.5861 (0.000)***	-	10.9975 (0.001)	10.9975 (0.000)	8.1489 (0.001)	26.5882 (0.000)***	8.4461 (0.000)
BD	0.010848 (0.742)	3.6997 (0.054)	0.00127 (0.972)	8.1965 (0.004)**	-	10.8304 (0.001)**	2.1493 (0.101)	2.0400 (0.153)	-0.68358 (0.500)
ODA	0.19637 (0.658)	0.31376 (0.575)	0.41692 (0.518)	0.4504 (0.703)	0.52322 (0.469)	-	1.7367 (0.188)	2.6932 (0.101)	0.42015 1 (0.678)
IRT	0.80764 (0.369)	0.00348 (0.984)	11.4925 (0.001)	10.308 (0.001)	6.4492 (0.011)	1.0110 (0.315)	-	0.54432 (0.461)	3.1343 (0.500)

Note: 1) Numbers not in parentheses are the joint coefficient of the corresponding variable and its lag.
 2) Numbers in parentheses refer to the F test significance level.
 3) ***, ** and * indicate significance at the 1, 5 and 10 per cent levels.

The results from Table 9 indicate that feedback occur between money supply and exchange rate as well as money supply and deficit. Moreover, the results from Table 9 suggest that overseas development assistance influence money supply and deficit at 1 percent level. Bi-directional causation occurs between interest rate and money supply. The findings of this result suggest that saving, tax, interest rate and financial deepening were endogenous as indicated by the significance of the t -test of the lagged error correction terms.

Therefore, the unidirectional causation between the export and growth support the argument that outward orientation is the route to growth. Also, the results suggest that feedback occur from real effective exchange rate, budget deficit and interest rate to money supply. However, unidirectional causation runs from overseas development assistance to broad money and budget deficit. The results reveal causation running from structural adjustment reforms to overseas development assistance.

F-tests from Table 10 suggest that for growth rate equation, human capital, population growth rate, export and inflation explain the variation in the growth rate at different significance levels (1, 5 and 10 percent level) but the effects are bidirectional between export and output as well as export and human capital. This result supports Fisher's (1993) findings suggesting causation runs from good macroeconomic policy to growth. Results from Table 10 reveal that population growth rate influences human capital development at 1 percent level, but the effects are unidirectional. Structural and institutional reforms affect domestic investment and population growth at 1 and 5 percent significance level. The insignificance of error correction for the population growth rate, deficit, export, and inflation suggests that these variables are weakly exogenous.

Table 10: Temporal Causality Results Based on Vector Error Correction Model (VECM) for Growth

Dep. Var.	ΔGR	ΔINV	ΔHK	ΔPG	ΔBD	ΔVX	ΔINF	SA	ECT
F- statistics									t-statistics
AGR	-	0.4782 (0.489)	3.1873 (0.074)	2.5505 (0.110)	1.9508 (0.162)	4.0476 (0.044)	8.9705 (0.003)	0.1561 (0.692)	-3.901 (0.001)
ΔINV	0.00194 (0.996)	-	0.5529 (0.457)	2.598 (0.107)	10.3201 (0.001)**	1.3520 (0.245)	2.4612 (0.117)	8.3917 (0.004)	2.7435 (0.011)
ΔHK	0.3509 (0.554)	1.928 (0.165)	-	7.2757 (0.007)	0.2068 (0.649)	8.0682 (0.005)	1.5847 (0.208)	2.3193 (0.020)	2.3193 (0.028)
ΔPG	0.4273 (0.513)	0.0899 (0.764)	0.5982 (0.442)	-	2.66260 (0.1030)	3.1065 (0.078)	1.7350 (0.188)	3.7695 (0.052)	-1.5014 (0.145)
ΔBD	0.00125 (0.972)	0.38396 (0.535)	1.7101 (0.191)	0.02030 (0.887)	-	2.1306 (0.144)	1.0832 (0.298)	1.6668 (0.197)	1.2910 (0.208)
ΔVX	0.000125 (0.965)	0.0193 (0.889)	3.1671 (0.075)	5.3427 (0.021)	0.8979 (0.343)	-	2.0750 (0.150)	0.0783 (0.779)	0.61160 (0.546)
ΔINF	0.75281 (0.386)	1.4518 (0.228)	0.81662 (0.366)	0.71013 (0.399)	0.047249 (0.828)	1.2106 (0.271)	-	1.7160 (0.1900)	0.14000 (0.890)

Note: 1) Numbers not in parentheses are the joint coefficient of the corresponding variable and its lag.
 2) Numbers in parentheses refer to the F test significance level.
 3) ***, ** and * indicate significance at the 1, 5 and 10 percent levels

Conclusion and Policy Implications

The main objective of this study is to evaluate the impact of the stabilization and structural adjustment programs (advocated by the World Bank and the International Monetary Fund on macroeconomic performance (i.e. saving, investment and output growth) of Sudan. The findings suggest that there exist long run relationships among them. The Granger causality test indicates that structural and institutional reforms have significant impacts on macroeconomic variables (e.g saving, investment and growth rate) and the effect is unidirectional running from structural and institutional reforms to macroeconomic variables.

The findings of this study indicate the interrelationship among savings, investment and growth. There exist feedback between saving and output

growth rate and unidirectional causation running from saving to investment. It should be mentioned that the process of rapid development may involve a virtuous circle where higher growth leads to higher domestic saving which in turn raise domestic capital formation that leads to even higher growth rates. The strong association between domestic investment and domestic saving implies that there is only a weak association between net foreign investment and domestic savings. This study suggests that the inclusion of the domestic interest rate in the specification has a direct impact on domestic saving/investment during the period under consideration. The estimated coefficient of the interest rate on saving equation is found to be negative and likely to be significant at 10 percent level. Our study recognizes interest rate as an important policy tool. The Bank - Fund packages require government to raise interest rate so as to stimulate domestic saving and discourage the flight of private capital. They suggest that a higher real interest rate discourages private consumption and boosts private investment relative to its base year level. This is because higher real interest rate raises the propensity to save, and so reduces the propensity to consume of the private sector.

The Granger causality test indicates that structural and institutional reforms have significant impacts on overseas assistance and the effect is unidirectional running from structural and institutional reforms to overseas assistance. This result suggests the complementary role between the Bank and Fund.

The estimated parameter for dependency ratio on saving equation is negative as expected and is statistically significant at 10 percent level suggesting that a growing population includes a large number of young people who tend to consume more than they produce. In the absence of an offsetting increase in the income of adults or decrease in their consumption, the effect will be a reduction in aggregate saving. The results of the long run estimates in saving equation indicate that financial deepening affect saving positively but insignificantly. The conclusion from this result is that reforms have had a widely positive impact on the Sudanese financial system, but this impact remains weak and different from that of other countries. Due to many reasons, for example, the trend

of growing velocity has been reversed. Monetary aggregates and deposit stated rose in real terms. It should be mentioned that all main indicators of financial intermediation- inverse velocity, domestic credit, deposit, declined as ratio to GDP before 1997. However, the overall level of financial system remains low and the reforms have not had a noticeable impact on financial intermediation.

Also, Granger causality running from export to growth highlighted the role of export in explaining the growth rate in Sudan. This could be attributed to several reasons; the export sector serves as the vehicle for technology transfer through the importation of capital goods (Chen, 1979). Second, by raising the capacity to service external debt, and thus by improving creditworthiness the expansion of the export sector induces higher flows of foreign credits that make higher investment obtainable. Moreover, the transfer of efficient foreign technologies and the availability of foreign exchange have featured prominently in recent experiences of economic development. Furthermore, according to Balassa (1987) and Krueger (1978) countries with superior export performance show superior growth performance.

This study also found that development in human capital generates growth. This supports the view that strengthening human capital is of major significance in generating dynamic development. In the growth equation the error correction terms are not significant for inflation, population growth rate, export and budget deficit. This implies that the effects of all these variables are short run. This finding is consistent with the argument that inflation and other short run macroeconomic management factors affect economic growth (Fisher,1990) Moreover, the results of this study suggest that the negative relationship between inflation and growth is prima facie evidence that the quality of macroeconomic management affects growth.

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