Journal of Applied Economics and Business

OPEN ACCESS ARTICLE

DOES TANZI MODEL FIT THE SUDAN ECONOMY?

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Abstract

This paper aims to provide an empirical evidence from the Sudan economy for estimating the size of the informal sector. Tanzi model has been replicated with some modifications by including real growth rate of the economy as exogenous variable, excluding interest rate because dealing with interest has been abolished since 1983, and replacing the ratio of personal income tax by total tax to GDP ratio. Error correction model was estimated via EViews 8. Results showed that the modified Tanzi model fits to Sudan economy, and found that the average size of the underground economy is 20.2% of GDP mainly derived from bank services of 16.5%.

Key words:

Underground economy; Tanzi model; Fitness; Tax burden.

INTRODUCTION

The terminologies informal, unofficial, underground, shadow, black, and hidden, are used interchangeably to describe the state of activities and income that are partially or fully outside government regulation, taxation, and observation (Johnson et al., 1997; ILO, 2002; Hussmanns, 2005; Michael, 2007; La Porta & Shleifer, 2008; Bello et al., 2011; Vo & Pham, 2014). Many definitions has been put to this phenomenon, but this paper adopts the definition of the International Labor Organization as follows: the informal economy refers to "all economic activities by workers and economic units that are – in law or in practice – not covered or insufficiently covered by formal arrangements" (ILO, 2002). The size and factors affect this sector divers widely from an economy to another. The main characteristic of the informal sector are easy entry, family ownership, small size, labor intensive, skill are obtained through long experience out the official education (Hassan, 2007). The negative aspects of informal sector are non-payment of proper wages, compulsory overtime, layout without notice or compensation, unsafe working conditions, and absence of social benefits such pensions, sick pay, and health insurance.

Sudan is a developing country, has dual economy composed of the traditional and modern sector. The country depends mainly on the agricultural sector for the livelihood of 46% of its population, as inputs to the manufacturing sector, and 90% of its non-oil exports. Informal sector practices are apparent in the traditional sector i.e. the traditional rainfed and handicrafts subsectors for instance agricultural finance. According to World Bank's Sudan Private Investment Climate Survey PICS of 2008 (UNDP, 2014), the services sector is dominated by retail services (80%). The bulk of (96%) of service sector firms are of small size. Thus it contains some aspects of informalities in terms of mobility and unlicensed street trading, smuggling, used car dealing, and traditional transportation. In the manufacturing sector there are many unregistered firms or registered firms but hidden from taxation accounts for a good deal of production as well. The industrial survey by the Ministry of Industry in 2005 pointed out that about 93% of the entities of the manufacturing sectors are of small size hiring less than 10 workers. This small number of workers is one of the main features of the informal sector. There is no accurate statistics about the size and structure of the informal sector in Sudan. Suliman (2005) measured tax buoyancy and elasticity via Tanzi model over the period 1970-2002 estimating the informal sector to be about 30% of GDP.

The informal sector in Sudan has been studied by few scholars to my knowledge. Mohammad et al., (1991) surveyed 1750 enterprises estimated via multiple regression the effects of demographic variables on enterprises net income, finding that informal sector in Khartoum is predominantly a family based enterprise system. Nearly nine-tenths of the enterprises or shops were found to be operated and managed by owner himself or his relatives. More than half of the enterprises were relying exclusively on family labour. Those hiring labour employed roughly one-fourths of their work force from their relatives.

Brown (1992) based on survey data on Sudanese migrants abroad over the period 1978-1987 via a simple macroeconomic accounting framework found that the revised macroeconomic aggregates incorporating the unrecorded international financial flows and domestic transactions associated with "hidden" adjustment processes give a completely different picture of Sudan's economic imbalances and the nature of the microeconomic processes underlying these.

Cohen & House (1996) focused on intersectoral earnings differences in Khartoum pursued the hypothesis that the overlooked labor market network affect the relationship between the labor market segments and earnings. Badawi et al., (2002) focused on Sudanese women working in food and beverages business in urban markets of Khartoum State. They validated the hypotheses that business women are highly stimulated by their socio-economic conditions and that their work in the market has positively affected their families' life and their ability to survive. Hassan (2007), and Abdelmageed (2009), analyzed primary data collected from River Nile State, and Karri locality using descriptive statistics respectively. ECA (2012) reported that since the 1990s there has been a boom in the informal sector and a proliferation of smaller employers; an estimated 60% of the workforce is directly engaged in the informal sector. As a result, labour codes are not consistently applied.

This paper differs from others in following: choice of the study period that covers the current (Ingaz) regime, model variables, data sources, estimation method, and the objective i.e. replication of a modified version of Tanzi model to measure the size of the informal economy in Sudan over the period 1990-2014. It organized as follows: Section II devoted to literature review, Section III contains theoretical background, Section IV introduces methodology and data collection, Section V presents empirical results and discussion, and finally the conclusion.

LITERATURE REVIEW

The measurement of the underground economy has been carried out by different approaches. The currency demand approach CDA is the most popular one, suggested by Cagan (1958), applied by Tanzi (1980 and 1983) for the USA, and Iqhal et al., (1999) to estimate the size and trend in the growth of the underground economy and tax evasion in Pakistan over the period 1973-1996, Deleanu and Ferwerda (2009) to overcome the critique of the model of Tanzi (1983) by applying his model to the natural experiment of the introduction of the Euro, Faal (2003) to improve the validity and robustness of previous estimates of Tanzi for Guyana using error correction model, Suliman (2005) analyzed the tax system buoyancy over the period 1970-2002 via Tanzi model. He found that the tax system as a whole is not buoyant or elastic up to (Vuletin, 2008) to measure the Informal economy in Latin America and the Caribbean, Arby et al., (2012), Ferwerda et al., (2010) to determine the size of the informal economy in Pakistan, Ardizzi et al., (2011) to apply and reinterpret the traditional Currency Demand Approach (CDA) to a panel of 91 Italian provinces using random effects–Tobit approach. Haque (2013) to estimate the size of the underground economy of Bangladesh over the period 1973-2008 by a modified version to fit Bangladesh economy.

Another widely used is the multiple indicators multiple causes MIMIC approach. it has been used widely alone and in combination with other approaches to present the connection between formal and informal economy for one country and a group of countries as shown by Trebicka and Brunela (2014) in estimating Italian informal sector, Vo and Pham (2014) in studying informality in ASEAN, Arby et al., (2012) calculating informal Pakistani economy, Bello et al., (2011) for Albanian informal sector, Schneider et al., (2010) for 162 countries, developing, Eastern European, Central Asian, and high-income countries Vuletin and Guillermo (2008) for 32 mainly Latin American and Caribbean countries, Dell'Anno (2007) Portuguese shadow economy, Dell'Anno and Schneider (2006) and Krakowski (2005) for Latin America.

Kemal and Qasim, (2010) introduced new approach to measure the size of the informal economy calling it "KQ" (Kemal and Qasim) approach or discrepancy approach, calculating total private consumption from the household survey for the total population and adjust it for trade misinvoicing and calculate the true estimates of the GDP which is then compared with the GDP estimates reported in the National Accounts (at current prices). The difference between the two is the size of the informal economy.

Electricity approach used by Kaufmann and Kaliberda (1996) to estimate the size of the informal sector in Mozambique proposing that the electricity consumption is the best indicator of economic activity.

Descriptive approach has been used by Kaufmann and Parlmeyer (2010) to present the situation of small business in Mozambique, Abdelmageed (2009) to show the effects of the informal sector on Sudan economy by examining its contribution to the gross domestic product and employment of Karari locality. She found that the informal sector has positive effect on the GDP, and the economic and social factors play important role in directing labour force towards the informal sector. Hassan (2007) identified the features, causes, and expansion of the informal sector in River Nile State of and economic effects of the informal sector on the national economy. He reached the conclusion that, although the informal sector provides employment for a large number of people, however, the considerable expansion of this sector to the harm the economy of the River Nile State. Three quarters of the respondents do not deal with the banks, in addition to, 44.7% of whom do not pay taxes.

Labor market indicators were a legitimate measure of the informal sector as seen in Kay David Duane (2011) who provided an empirical evidence about the heterogeneous sub-sectors within South Africa's informal sector, and that race is a significant identifier of informal sector, Luebker (2008) who analyzed the quality of employment, unemployment and informality in Zimbabwe on the basis of the 2004 Labour Force Survey finding that informal employment, in particular, made a substantial contribution to overall employment and accounted for just over 80% of all jobs in 2004. However, cash incomes of informal workers were generally extremely low and their poor working conditions.

THEORETICAL BACKGROUND

There are six approaches for the estimation of shadow economy:

(1) Currency demand;
(2) Transaction approach;

(3) Discrepancy between national expenditure and income statistics;
(4) Discrepancy between official and actual labor force;
(5) Electricity approach; and
(6) Multiple indicators Multiple Causes.

The first approach assumes the prevalence of transaction motive to avoid tracing then paying tax. The dependent variable is taken to be ratio of currency in circulation, or sum of currency in circulation, to broad money. Exogenous variables are bank services either ratio of demand deposits to commercial banks accounts, or bank branches per person; real per capita income, growth of real per capita income; ratio of direct tax to GDP, local and foreign trade tax to GDP, total tax to GDP, and real interest rate.

The second approach assumes that the ratio of informal economy to formal is known for a base year, and constant product of velocity of circulation time money supply. It uses quantity theory of money to calculate the informal economy. This approach has been criticized on the basis of its assumption, and not paying attention to other factors.

The third approach assumes that the tax evasion makes a discrepancy between income and expenditure which indicates informality. The criticism to this approach is that the difference between income and expenditure does include other errors and omissions.

The forth approach assumes the constancy of the total labor force, any decrease in the official labor force is considered as an indicator of growing informal economy.

The fifth approach is the electricity consumption assumes that an increase in electricity consumption is an indicator of informal activities, the difference between growth of electricity consumption and growth of official GDP is taken as a proxy for the growth of the informal economy (Kaufmann & Kaliberda, 1996). Increased unemployment might lead to a crowding out of illegal low skilled workers by legal higher skilled workers, who – under the threat of being unemployed otherwise – might accept lower paid jobs. There might therefore be a negative relationship between unemployment and the shadow economy Ferwerda et al., (2010).

The last approach is Multiple indicator multiple cause (MIMIC) procedure assumes that the shadow economy remains an unobserved phenomenon (a latent variable) which can be estimated using quantitatively measurable causes of shadow economic activity as well as indicators of illicit activity. The causes will include variables such as the tax burden and the intensity of regulation and the indicators will include variables such as the demand for currency, official national income figures and official working hours data. The causal variables are the tax-to-GDP ratio, the Heritage Foundation index of economic freedom, the unemployment rate, GDP per capita, and lagged values of the latent variable.

METHODOLOGY AND DATA

The Proposed Model

To avoid criticisms that faced Tanzi model modification has been made to include government consumption to GDP ratio as exogenous variable. Total tax to GDP ratio, bank services, and per capita income has been retained and eliminating interest rate because dealing with interest has been abolished since 1983 after the introduction of Islamic Laws. To avoid the problem of unit root and spurious regression unit root and cointegration test has been carried out. Results suggest the following specification of the error correction model:

$$\Delta(SE)_t = \alpha_0 + \beta_1(SE)_{t-1} + \beta_2(TTAX1)_{t-1} + \beta_3\Delta(TTAX1)_{t-1} + \beta_4(BS)_{t-1} + \beta_5\Delta(BS)_{t-1} + \beta_6 Q_{t-1} + \beta_7\Delta Q_{t-1} + \beta_{10}(GR)_t + \theta\varepsilon_{t-1}$$

It is expected that the sign of total tax to be positive since an increase in total tax leads to an increased demand of holding money to avoid paying taxation i.e. stimulating the expansion of informal economy, whereas the contrary happens if there is improvement in bank services, people are encouraged to deposit their money in banks, and a rising level of per capita income lower the demand for holding money.

Description of Variable and Data Sources

The data set was collected mainly from two official sources i.e. Central Bureau of Statistics and Central Bank of Sudan for the period 1990-2014.

TABLE 1. DESCRIPTON OF VARIABLES

Variable	Symbol	Source
Ratio of Narrow Money to Broad Money	SE	Central Bank of Sudan
Demand Deposits	DD	Central Bank of Sudan
Currency in Circulation	PUB	Central Bank of Sudan
Bank Services	BS	Constructed Variable
Ratio of Total Tax Revenue to GDP	TAX1	Central Bureau of Statistics
Gross Domestic Product	GDP	Central Bureau of Statistics
Per capita Income	Q	Central Bureau of Statistics
Real GDP Growth rate	GR	Central Bureau of Statistics
Population	POP	Central Bureau of Statistics

The Size of Shadow Economy in Sudan

Following Tanzi and Iqhal et al., (1999) the underground first illegal money (IM) is calculated as the difference between the predicted value of dependent variable (M1 ratio) with and with tax ratio is computed and multiplied by M2 that is (baseline scenario - scenario1)*M2. Second legal money (LM) is estimated by subtracting illegal money from money supply (M2). Then the velocity of legal money (LV) is obtained by dividing growth domestic income (GDP) by legal money. Assuming that the velocity of illegal money is same as that of legal money, an estimate of the underground economy (UE) can be obtained by multiplying illegal money (IM) by the income velocity of money (IV). Tax evasion is estimated by applying the actual tax revenue to the estimated informal GDP. The same is done for real per capita and bank services (Iqbal et al., 1999; Fall, 2003; Haque et al., 2013).

EMPIRICAL RESULTS AND DISCUSSION

Results

TABLE 2. UNIT ROOT TESTS

Variable	Prob. – Level	Prob. - Ist diff	Prob. -2nd	Order of Integration
SE	0.2024	0.0026		I(1)
TAX1	0.6103	0.0003		I(1)
Q	0.979	0.0000		I(1)
BS	0.5104	0.0003		I(1)
GR	0.0007			I(0)

TABLE 3. COINTEGRATION TEST

Date: 01/07/16 Time: 16:10				
Sample: 1990 2014				
Included observations: 25				
Trend assumption: Linear deterministic trend				
Series: SE BS Q TAX1				
Lags interval (in first differences): 1 to 1				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.737707	53.46817	47.85613	0.0136
At most 1	0.395031	20.01087	29.79707	0.4221
At most 2	0.213865	7.446424	15.49471	0.5263
At most 3	0.055624	1.430766	3.841466	0.2316
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level4				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Since there is one cointegrating equation ant the 0.05 level, Vector Error Correction Model (VECM) would be the preferred choice. Endogenous variables are lagged and first difference underground, total tax, per capita GDP, and bank services, and the constant. The only exogenous variable is the real growth rate.

All estimated coefficients have the correct sings in both the short-run and the long-run and significantly different from zero in the long-run, whereas real per capita income got the correct sign in the short-run, and significantly different from zero, indicating low adjustment of insignificant variables. It is evident that tax burden has greatest effect on expansion of the informal sector followed by real per capita income. The empirical size of the informal economy is almost 10 per cent of GDP as a result of an increase in total tax a results that is in line with the finding of Tanzi (1983) and Ferwerda et al, (2010). About 65% of disequilibrium is corrected annually. The average response of underground economy to a rise in total tax, decline in bank services, and decline in per capita income is 3.6%, 16.5% and 0.1% respectively. Thus the total size of the underground economy to GDP is 20.2%.

TABLE 4. SUMMARY OF VECM ESTIMATION RESULTS

Dependent Variable	Narrow Money to Broad Money ratio	
Explanatory Variables	Long-run	Short-run
SE(-1)	1.000	
TAX1(-1)	17.788***	
Q(-1)	-0.177***	
BS(-1)	-0.506**	
C	-0.405	
ΔSE(-1)		0.518
ΔTTAX1(-1)		0.842
ΔQ(-1)		-0.576***
ΔBS(-1)		-0.084
GR		0.001***
C		-0.061**
Error Correction	-0.65***	
R^2	0.699	
$\bar{R}^2$	0.599	
Akaike AIC	-13.834	
Schwarz SC	-12.274	

*, **, *** denotes rejection of the hypothesis at 0.10; 0.05 and 0.01 level

TABLE 5. RATIO OF UNDERGROUND ECONOMY TO GDP

Year	Total/GDP[4]	UE/GDP[1]	UE1/GDP[2]	UE2/GDP[3]
1990	29	-0.7	27.9	-0.22
1991	25	-2.4	26.5	-0.10
1992	28	-4.2	32.3	-0.24
1993	23	-3.8	27.1	-0.22
1994	17	-3.3	20.3	-0.18
1995	10	-1.3	11.3	-0.04
1996	9	-0.3	8.9	0.00
1997	6	-2.0	7.6	-0.01
1998	7	-0.1	7.1	0.00
1999	9	0.0	8.7	0.00
2000	12	2.1	10.0	0.02
2001	12	2.3	9.9	0.03
2002	13	3.3	9.9	0.04

[1] Underground economy as a result of total tax
[2] Underground economy as result of bank services
[3] Underground economy as result of per capita GDP

2003	16	3.9	11.6	0.06
2004	16	4.1	12.3	0.06
2005	20	4.7	15.0	0.10
2006	24	6.3	17.2	0.19
2007	25	7.7	16.8	0.23
2008	26	8.3	17.4	0.25
2009	31	11.9	19.2	0.34
2010	35	14.0	20.2	0.40
2011	33	12.1	20.8	0.38
2012	33	11.5	21.5	0.35
2013	27	9.6	17.5	0.24
2014	20	5.0	14.5	0.14
Average	20.2	3.6	16.5	0.1

Discussion

The start period of this study coincides with the advent of new political rule by a military coup that holds a firm grip of power, governing the Sudan by one political party (National Congress), imposing concepts of free market, privatization of public enterprises, including profitable corporations, such as telecommunication, Sudan shipping line, and Sudan airways. Contrary to its declared polices the regime resorted to political control of economic activity, and business, allowing the acquisition of schemes by national security apparatus, police and armed forces. Regulatory efficiency composed of business freedom, and labor freedom scores are below the average, while monetary free is slightly above the average (see Annex 6.). At the same time the regime paid little attention to the rehabilitation of agricultural schemes, and Sudan railways which were once the main source of non-tax revenue. Budgetary allocation to infrastructure, health and social services has dwindled. Development projects have been financed by external loans adding to the pile of external debt.

The regime lacks transparency, and accountability, 70 billion of oil proceeds has vanished, Sudan ranked by corruption perception index 112 position in 2003, descended 176 in 2009 (Annex 4.), and scored 11 points by economic freedom index 2015 ranked as the second least country free from corruption above Afghanistan. Adoption of free international trade opened the gate to violate the laws by exporting prohibited goods such female animal resources, and importing goods without paying attention to quality, safety and competition with local industries.

Formal recruitment of employees has been based on the notion of loyalty to the ruling party than to competence, hence increasing the level of unemployment especially among graduates, whereas disguised unemployment is an apparent feature of civil service. Large government size and the direction of large portion of the fiscal budget to security and military purposes leading to sustained fiscal deficit.

Public expenditures are equivalent to 13.6% of GDP, and public debt equals 91% of GDP (economic freedom index 2015).

However, the outcome of these practices have been civil war, secession of the South Sudan, rising inflation rates, continuous devaluation of the local currency, rising poverty rate, mounting external debt, fiscal, and international trade deficits, an increasing dependence on taxation as a main source of revenue whereas the total tax burden is 8% of GDP. This adverse situation has been conducive to the expansion of both legal and illegal informal sector "smuggling, drug trafficking, money laundering, and black market of foreign exchange transactions". Empirical results ascertained the role of taxation, bank services, and per capita income in explaining growth of informal sector. However the banking services and real growth of the economy have a positive sign contrary to expected a result can be interpreted as the ratio follow the same path of the dependent variable. The ratio of underground economy to GDP has been fluctuating over the period 1990-2004, then has upward trend up to 2009, then turned to downward trend.

It can be noticed that the ratio of the informal sector was low and declining during the period 1996-1999, due the new macroeconomic policies adopted by the minister of finance at that time Dr. Abdulwahab Sheikh Musa who succeeded in reducing the inflation rate from the highest ever rate of 129 to one digit, and stabilized the economy and foreign exchange market.

In 2000 the governor of the central bank of Sudan launched reform policy of the banking system targeting minimum capital adequacy, infrastructure, reducing non-performing loans broadening transparency and disclosure efficiency. Bank services are expected to improve if the reform policy succeeds, fighting corruption, and law enforcement become a top obligation to the president Sudan as he announced at his third term in office, imposing fare tax rates, strengthen the administration through information technology and training will reduce tax evasion. Reducing the fiscal deficit through redirecting the finance to the production sector plays important role in reducing the size of tax evasion and underground economy.

CONCLUSION

The main purpose of this paper is to measure the size of the informal economy of Sudan over the period 1990-2014. The finding of error correction model revealed long-run relationship among currency demand, per capita income and the bank services. Tax burden is the main cause beside per capital income and bank service in expanding the informal sector.

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ANNEX

1. SUMMARY STATISTICS

	SE	BS	TTAX1	Q	GR
Mean	0.56	0.18	0.08	5.75	5.52
Median	0.58	0.21	0.06	5.34	6.00
Maximum	0.68	0.32	0.16	8.79	11.56
Minimum	0.40	0.02	0.04	3.42	-5.47
Std. Dev.	0.08	0.09	0.04	1.83	3.46
Skewness	-0.56	-0.55	0.46	4.96	-1.06
Kurtosis	2.20	2.01	1.57	18.74	5.48
Jarque-Bera	1.97	2.31	2.99	2.35	11.04
Probability	0.37	0.32	0.22	0.31	0.00
Sum	13.97	4.44	2.05	14.37	138.06
Sum Sq. Dev.	0.15	0.19	0.04	0.80	288.06
Observations	25	25	25	25	25

2. VECM ESTIMATES

Vector Error Correction Estimates				
Date: 01/08/16 Time: 22:57				
Sample: 1990 2014				
Included observations: 25				
Standard errors in ( ) & t-statistics in [ ]				
Cointegrating Eq:	CointEq1			
SE(-1)	1			
BS(-1)	-0.506			
	-0.21482			
	[-2.35547]			
Q(-1)	-0.38768			
	-0.14117			
	[-2.74617]			
TTAX1(-1)	1.787712			
	-0.5998			
	[2.98052]			
C	-0.40451			
Error Correction:	D(SE)	D(BS)	D(Q)	D(TTAX1)
CointEq1	-0.64629	-0.27331	0.069886	-0.00438
	-0.14381	-0.10825	-0.14812	-0.0706
	[-4.49392]	[-2.52473]	[0.47182]	[-0.06204]
D(SE(-1))	0.133482	0.171948	-0.17614	0.083113
	-0.22347	-0.16821	-0.23016	-0.10971
	[0.59731]	[1.02221]	[-0.76527]	[0.75760]
D(BS(-1))	-0.08418	-0.23918	0.394793	-0.0732
	-0.31786	-0.23926	-0.32737	-0.15604
	[-0.26484]	[-0.99966]	[1.20596]	[-0.46913]
D(Q(-1))	-0.57566	-0.61186	-0.40601	0.031426

	-0.21689	-0.16325	-0.22338	-0.10647
	[-2.65419]	[-3.74792]	[-1.81759]	[0.29516]
D(TTAX1(-1))	0.517544	-0.48854	-0.62478	0.141518
	-0.59394	-0.44707	-0.61171	-0.29157
	[0.87138]	[-1.09276]	[-1.02136]	[0.48536]
C	-0.06097	-0.02209	0.013289	0.014999
	-0.02141	-0.01612	-0.02205	-0.01051
	[-2.84766]	[-1.37075]	[0.60266]	[1.42707]
GR	0.01118	0.006748	0.002801	-0.00205
	-0.00348	-0.00262	-0.00358	-0.00171
	[3.21588]	[2.57851]	[0.78228]	[-1.20223]
R-squared	0.698972	0.577568	0.215167	0.117946
Adj. R-squared	0.59863	0.436757	-0.04644	-0.17607
Sum sq. resids	0.05112	0.028964	0.054225	0.01232
S.E. equation	0.053292	0.040114	0.054886	0.026161
F-statistic	6.965857	4.101731	0.822472	0.401154
Log likelihood	41.93228	49.03379	41.19513	59.7195
Akaike AIC	-2.79458	-3.3627	-2.73561	-4.21756
Schwarz SC	-2.4533	-3.02142	-2.39433	-3.87628
Mean dependent	-0.01112	-0.00021	0.01992	0.003948
S.D. dependent	0.084117	0.05345	0.053654	0.024124
Determinant resid covariance (dof adj.)		3.32E-12		
Determinant resid covariance		8.92E-13		
Log likelihood		204.9286		
Akaike information criterion		-13.8343		
Schwarz criterion		-12.2741		

3. CORRUPTION PERCEPTION INDEX OF SUDAN

Year	2003		2005		2007		2009	
CPI*	Score	Rank	Score	Rank	Score	Rank	Score	Rank
	2.3	112	2.1	149	1.8	172	1.5	176

Source: Transparency International

4. SUMMARY STATISTICS

	SE	BS	Q	TTAX1
Mean	0.560083	0.174576	519.2851	0.080369
Median	0.583548	0.21864	518.152	0.055
Maximum	0.676695	0.321854	863.6094	0.159403
Minimum	0.403672	0.020323	342.4966	0.036937
Std. Dev.	0.081687	0.092509	128.7321	0.044174
Skewness	-0.58395	-0.44579	0.715124	0.604185
Kurtosis	2.073812	1.830001	3.382338	1.62089
Jarque-Bera	2.129224	2.073655	2.100466	3.222018
Probability	0.344862	0.354578	0.349856	0.199686
Sum	12.88191	4.015241	11943.56	1.848479
Sum Sq. Dev.	0.146801	0.188273	364583.2	0.04293
Observations	23	23	23	23

5. ECONOMIC FREEDOM

Freedom	Business	Labor	Monetary	Investment	Trade
Index	49	43.8	52.8	15	55.6

Source: Index of Economic Freedom

6. TAX RATES 2015

Tariff Rate%	Income Tax Rate%	Corporate Tax Rate %	Tax Burden of GDP
14.7	10	35	5.7

Source: Index of Economic Freedom

ANNEX 7. UNDERGROUND ECONOMY & GDP

	UE	UE1	UE2	Total	GDP	Total/GDP
1990	-784	30684	-237	31653	110111	29
1991	-4532	50867	-186	48140	192060	25
1992	-17611	136192	-1008	119564	421818	28
1993	-35743	256566	-2075	220741	948466	23
1994	-61957	381079	-3476	317640	1881289	17
1995	-71699	623353	-2183	551466	5522838	10
1996	-34836	1000539	-173	967525	11194938	9
1997	-365608	1399388	-1562	1034215	18318179	6
1998	-19258	1785443	543	1768726	25080913	7
1999	8309	2281992	377	2292677	26301423	9
2000	644497	3114059	7515	3768071	31037068	12
2001	892707	3831963	10714	4737386	38763329	12
2002	1643070	4976703	17942	6639717	50204397	13
2003	2238691	6578963	31307	8850963	56720953	16
2004	2890086	8643125	44332	11579547	70383228	16
2005	4014749	12748147	85082	16849983	85105084	20
2006	5973644	16415760	180918	22572328	95396107	24
2007	8291161	18011849	248681	26553697	107204713	25
2008	10012151	21033611	299135	31346906	121166028	26
2009	16086052	26053944	459120	42601125	135659000	31
2010	22685845	32713520	648376	56049751	162203900	35
2011	22572954	38785770	700239	62060974	186689900	33
2012	28009377	52258052	859406	81128848	243412800	33
2013	32984812	60043054	814086	93843965	342803300	27
2014	23675649	69037964	642899	93358526	475827700	20