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Fiscal Management and Commodity Price Fluctuation in Sub-Sahara Africa

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Abstract

Fiscal policy in resource-rich country should be consistent with achieving macroeconomic objectives such as macroeconomic stability and an efficient allocation of resources especially when its role in injecting share of resource rent into domestic economy is considered in Africa. However, reliance on revenue from commodity exports renders fiscal management, budgetary planning and efficient use of public resources demanding. This study thus investigates linkages between commodity prices and fiscal operations among sample of commodity exporters in SSA. Using data for 1992 to 2017 for nine resource-rich countries in SSA region, panel co-integration and and fully modified OLS (FMOLS) technique to determine long run relationship effects. The study finds that elasticity of fiscal policy measures with respect to output gap was significant and positive suggesting that fiscal policy is actually procyclical among our sample of SSA countries. Moreover, it is found that fiscal policy has not performed well in delivering macroeconomic stabilization. The difficulty in applying fiscal stabilization measures is attributable to unstable revenue inflow due to extremely volatile environment of commodity prices in global market. Our policy advice is that governments in commodity exporting SSA countries should track fiscal strategies aimed at breaking procyclical response of expenditure to macroeconomic cycles.

Keywords: commodity prices, fiscal policy, fiscal procyclicality, SSA, Dynamic OLS.

1. Introduction

Countries that rely on primary resources for substantial share of their revenue face certain unique fiscal challenges: the revenue stream is exhaustible, uncertain, volatile, and largely originates from abroad. These problems raise several challenges for fiscal policy and for economic stabilization. In fact, instability in fiscal revenue complicates macroeconomic management, budgetary planning, and the efficient use of public resources. Large declines in revenues often cause sharp cuts in expenditure which is disruptive and costly (Taylor, 2000; Barnett, Ossowski, 2002; Asfaha, 2008). Increases in revenues may lead to temptation to raise spending to unsustainable levels, and to pay insufficient attention to quality of projects. This has given rise to the challenge of procyclicality of fiscal policy in many of such countries.

Empirical evidence suggests that commodity prices may have no well-defined time-invariant averages and that shocks are persistent (Cashin et al., 1999). Fiscal policymakers need to decide how expenditure can be planned and insulated from revenue shocks arising from the volatility and unpredictability of commodity prices.

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Many African countries have recently adopted medium term expenditure framework which should put fairly long term revenue streams into consideration when pursuing current expenditure measures such as using an oil price benchmark in budgetary operations. However, unconcealed reliance on commodity export for budgetary measures leaves the countries open to short term fiscal applications that may not be consistent with framework devised. Institutional factors that consistently deride resource-rich and primary commodity dependent countries could also play some role in this direction. It is against this background that a study as this is imperative.

This study therefore empirically examines effect of commodity price fluctuation on fiscal management among a group of resource-rich SSA economies and the extent to which such commodity price instability has affected the stabilization role of fiscal policy in these countries. Specifically, we investigate whether or not commodity price volatility has significant impact on the behavior of fiscal policy and whether fiscal policy actually responds counter-cyclically to business cycle in resource-rich countries. The study is divided into five sections, including this introductory section. In section two, pertinent literature regarding the study is reviewed, while in section three, the methodology and modeling is performed. The empirical analysis with accompanying implications is done in section four, and we conclude in section five.

2. Discussion

Use of Fiscal Policy

To look at the various aspects of fiscal operations of government, it is common to split overall budget balance in two components: cyclical balance and cyclically-adjusted balance (Gali, 1994; Gavin, Perotti, 1997). Changes in cyclical balance give an estimate of the budgetary impact of aggregate fluctuations through induced changes occurring on supply side and certain mandatory outlays. By construction, cyclical balance is zero when output gap is closed (actual output is on trend), and its variations are thought to be outside the immediate control of the fiscal authorities. Subtracting cyclical balance from overall balance yields cyclically-adjusted fiscal balance (CAB). Changes in CAB are generally interpreted as resulting mostly from discretionary actions by policymakers (Fatas, Mihov, 2001).

Cyclically-adjusted fiscal balance itself reflects two dimensions of fiscal policy relevant for our analysis. The first is effect of policy decisions systematically related to changes in the actual or expected cyclical conditions of the economy (Debrun, Kapoor, 2010). The response of CAB to cycle can either be procyclical (running against automatic stabilizers) or countercyclical (augmenting the effect of automatic stabilizers).

Exogenous CAB can destabilize fiscal impulses associated with other objectives of public finances (redistribution and efficiency), or noneconomic considerations (e.g. politically motivated spending). Critical issues are to be taken into consideration, especially for a country like Nigeria. One of such issues concerns macroeconomic environment while formation of policy must include well-structured data base upon which policy should be based (Obada, Uga, 1996).

Fiscal Policy and Output Cycles

Two major types of theoretical objections have been raised against using fiscal policy for stabilization purposes, namely, technical effectiveness of such policies and ability of policy makers to use fiscal stabilization policy in an effective way (EEAG, 2003). The discussion of the technical effectiveness of fiscal policy takes its starting point in the notion of so-called Ricardian equivalence (Elmendorfand Mankiw, 1999).

The argument is that tax reductions or transfer increases that raise the disposable incomes of households will fail to increase private consumption if they involve larger budget deficits: households will realize that their life-cycle incomes have not increased, as they will have to pay for the deficits through higher taxes or lower transfers in the future. Another argument holds that tax reductions or government expenditure increases could even give rise to perverse negative demand effects if they are associated with credibility problems that lead to increased interest rates or to expectations of future “crisis adjustments” that will lower life-cycle incomes (Giavazziet al., 2000).

Procyclicality of Fiscal Policy in Resource-Rich Countries

On average, fiscal policy seems to be more countercyclical in OECD countries than in the non-OECD group (Debrun & Kapoor, 2010). The former not only have larger automatic stabilizers but also tend to exhibit a stabilizing cyclical response, although this may reflect greater stabilizers on the expenditure side of the budget. Non-OECD countries appear to have a penchant for procyclical policies, as most have negative response of government spending to output variations.

Weak spending regulation is found mainly in poor budgetary processes and execution, agency complications (Alesina, Tabellini, 2005), and common pool problems (competing groups fight for obtaining a greater share of any additional revenue (Tornell, Lane, 1999; Eichengreen et al., 1999).

On sample of 56 countries it was reported that fiscal policy in the G7 countries appears to be 'acyclical' while fiscal policy in developing countries is procyclical (i.e., fiscal policy is expansionary in good times and contractionary in bad times) (Talvi, Vegh, 2005). To explain this puzzle, they developed optimal fiscal policy model in which running budget surpluses is costly because they create pressures to increase public spending. Given this distortion, a government that faces large fluctuations in tax base finds it optimal to run procyclical fiscal policy.

In study of 22 OECD countries and 72 non-OECD countries some reported that response of fiscal policy is significantly counter-cyclical in OECD countries than in non-OECD countries and also fiscal policy move asymmetrically over the business cycle, especially in OECD countries, implying that budget deficits can grow over the business cycle (Lee, Sung, 2005).

However, the result revealed that in non-OECD countries, budget surpluses (fiscal policy) show a significant pro-cyclical response to negative GDP growth rates, but in the case of positive GDP growth rates, budget surpluses shows an insignificant (in OLS estimates) or countercyclical (in IV estimates) response. Elsewhere, pro-cyclical behavior of fiscal policy over period of 1965–2005, which seemed to have been even more pronounced in second sub-period was reported (Sturm et al., 2009).

Commodity Price Fluctuation and Domestic Economy

Commodity price shocks last long enough to significantly affect stabilization schemes in countries that are primary-export dependent. Indeed, it was found that one-third of the time the oil market will be faced with the prospect of a monthly price change greater than 8 percent (Cashin, McDermott, 1999). At current oil prices, in any month there is one-in-six chance that the spot oil price may drop by some US $ 2 per barrel.

Fiscal Management

It has been observed that volatility of commodity prices leads to conforming volatility in fiscal cash flow. The dependence of fiscal revenue on oil sector renders public finances to be vulnerable to volatile external variable outside control of policy makers (Barnett, Ossowski, 2002). Thus, dependence on oil as a major source of export earnings and government revenue confronts policymakers in oil-producing countries with the short run issues of how to address sharp and unpredictable variations in oil prices and revenues, and how to use oil revenues (Barnett, Ossowski, 2002).

Also, in Latin American countries' fiscal positions react strongly to shocks to commodity prices. Examples include, fiscal variables in Venezuela displaying highest sensitivity to commodity price shocks, with expenditures reacting significantly more than revenues, while in Chile expenditure reacts very little to commodity price fluctuations and the dynamic responses of its fiscal indicators are very similar to those seen in high-income commodity-exporting countries (Medina, 2010). However, there seems to be agreement about influence of fiscal institutions on fiscal performance (Corbacho, Schwartz, 2007).

General Economic Performance

Some resource-rich nations do grow slowly than resource-poor nations since commodity price booms are often abused (Funk, 2001). In fact, chain of events in modern Africa have shown tragedies arising from resource richness. Such issues include factors based on oil in Nigeria, coffee in Kenya, cocoa in Ghana, or copper in DRC (Obadan, Adegboye, 2013).

Volatile commodity prices, as may be experienced in the absence of price smoothing by the government, have been linked to lower output. Also, as oil prices rise, sectors where oil use is more intensive should see resources shift away to those sectors where it is less intensive, while constantly adjusting prices and outputs in response to changes in input costs leads firms to incur costs of adjustment, slowing short-run responses to changing prices (Bacon, Kojima, 2008).

Per capita growth rates are significantly reduced by large discrete negative commodity price shocks with substantial effect of negative shocks on growth and this seems to work independently of investment, which suggested that adjustment is achieved through severe reductions in capacity utilization (Dehn, 2000).

With VAR model, VECM and SVAR using seven key macroeconomic variables for Kuwait, government fiscal stimulus was main determinant of domestic prices, while monetary stimuli have the least results (Muscatelli et al., 2004). For some ECOWAS countries, increase in world oil prices

worsened fiscal deficit positions of oil importing countries while simultaneously, oil price increases was found to improved fiscal deficit of oil producing countries (Narayan, Liu, 2008).

Model and Methodology

Our Model

Basic econometric specification used to examine the long-run relationship between commodity prices and fiscal management is a conventional multivariate panel co-integration model of the form:

$$fisp_{it} = \alpha_i + \delta compr_{it} + \beta ygap_{it} + \gamma Z_{it} + \mu_{it} \quad (1)$$

where i = 1, 2, . . . , N is index of economy, t = 1, 2, . . . , T is index of timing, and the α_i are country-specific fixed effects. Following previous studies, we adopted ratio of fiscal deficit to GDP and ratio of government spending to GDP as measures of fiscal policy stance in each country. Also, *compr* is commodity price associated with each country based on its main commodity export, and *ygap* is output growth gap, measured as an HP filter of output growth for each country (Lee, Sung, 2005).

Z is vector of other variables in model including a measure of financial and institutional factors (*fdepth* and *inst*) respectively and dummy variable that captures periods of extremely high commodity prices and it is indicated as 1 for periods when prices exceed 75th percentile of distribution and 0 for periods with when oil prices were below or equal to 75th percentile. *fdepth* is measured as ratio of banking sector credit to GDP. The functional specification is:

$$fpol = f(cumpr, ygap, open, fdepth, inst, dummy) \quad (2)$$

The model indicates that commodity prices as well as other control variables tend to determine the behavior of fiscal policy in the countries. The model is akin to fiscal cyclicality models developed by Gavin and Perotti (1997) and Alesina and Tabellini (2005) which when developed into an econometric form easily shows a coefficient of procyclicality as below:

$$fpol = \alpha_i + \delta compr_{it} + \beta ygap_{it} + \gamma open_{it} + \gamma fdpth_{it} + \gamma inst_{it} + \gamma dummy_{it} + \gamma fpol_{it-1} + \mu_{it} \quad (3)$$

The fiscal policy cyclicality is captured by β, short-term response of fiscal policy to output gap. A positive value implies that fiscal policy is symmetric; cyclical boom is associated with an increase in government spending meaning that the behaviour of fiscal policy is procyclical and that government actions are systematically destabilizing. Relatively, negative coefficient on *YGAP* implies that on average, the government seeks to increase counter-cyclical bend of fiscal policy through discretionary measures.

The second analysis involves estimating output stabilization equation where commodity prices exert extensive effects. The model intends to show how fiscal policy affects output gap in the countries. Functionally, we have:

$$ygap = (fisp, compr, lag\ compr, inst, fdepth, dummy) \quad (4)$$

where all variables are as earlier defined. In its econometric form, the model is stated as:

$$ygap = \lambda_o + \phi fisp_{it} + \varphi compr_{it} + \pi_1 compr_{it-1} + \pi_2 inst_{it} + \pi fdepth_{it} + \pi dummy + u_{it} \quad (5)$$

The institutional factors included in our model are measures of corruption control in each country (*inst1*) and *resource rent (inst2)* present in each of the countries. The data for corruption control is reported by the World Bank *World Governance Indicator*. Resource rents are difference between value of resource production at world prices and total costs of production. It shows the relative efficiency at which the resource is extracted in each country.

The main source of inefficiency of extraction is level of corruption in country as well as weak human institutions in country. Hence, the variable is expected to have negative impact on either fiscal management or output in countries. In both models, we control for commodity prices in order to identify the general and particular effects of their fluctuations on fiscal policy and ability of fiscal policy to influence output volatility.

Estimation Method and Procedure

Standard least-squares dummy variable estimator is super consistent under panel co-integration, yet Pedroni (2002) showed that it suffers from second-order asymptotic bias arising from serial correlation and endogeneity such as case encountered in equation (3). Hence, its t-ratio is not asymptotically standard normal. To deal with this problem, one has to employ an asymptotically efficient (co-integration) estimator. So, we utilizes panel versions of dynamic OLS (DOLS) and fully modified ordinary least squares (FMOLS) methods are employed in the

estimations. As shown by Wagner and Hlouskova (2010), panel DOLS estimator of Mark and Sul (2003) outperforms other asymptotically efficient estimators.

Panel Unit Root Tests

A key necessity for the use of DOLS is requirement that all variables are uncorrelated series with individual effects. This assumption is guaranteed to be valid if series have constant means over time or are integrated of the first order. The study employed Panel Data co-integration techniques which involves first testing for panel unit root and then testing for panel co-integration. The general form for testing unit root for panel data analysis may be given as:

$$\Delta y_{it} = k_i + \alpha y_{it-1} + \sum_{j=1}^{x} \varphi_{ij} \Delta y_{it-j} + \epsilon_{it} \qquad (4.23)$$

$$\Delta y_{it} = k_i + \alpha y_{it-1} + \beta t \sum_{j=1}^{x} \varphi_{ij} \Delta y_{it-j} + \epsilon_{it} \quad (4.24)$$

where subscript $i = 1,2,3,\ldots N$ indexes countries, y is series of interest, α is indicator of serial correlation, ϵ is white noise term. Equations (4.23) and (4.24) was estimated using pooled OLS. The hypotheses are $F_i = 0$ and $F_i < 0$ respectively. For this study, panel unit root tests offered by Maddala & Wu (1999); Breitung (2000); Hadri (2000); Levin, Lin & Chu [LLC], (2002); and Im, Pearan&Shin [IMP] (2003) were employed. These tests restrict coefficient of lagged dependent variable to be identical across cross-sectional units, but permit lag order for first difference terms to vary across cross-sectional units, which in this study are countries.

Panel Co-integration Test

We conducted co-integration test on model by model basis. Using tests framed by Pedroni (1999), Kao (1999) and Maddala and Wu (1999). The tests proposed in Pedroni are residual-based tests which allow for heterogeneity among individual members of panel, including heterogeneity. Kao test follows same basic approach as Pedroni tests, but specifies cross-section specific intercepts and homogeneous coefficients on first-stage predictors. Maddala and Wu test uses Fisher's result to propose alternative approach to testing for co-integration in panel data by combining tests from individual cross-sections to obtain test statistic for full panel.

Data Issues

Data used are annual time series data for panel of commodity exporting countries in SSA. Sample of countries include Gabon, Angola, Cameroun, Congo D.R., Ghana, Kenya, Tanzania, Equatorial Guinea, Nigeria, Sudan, and Zambia. The data covered period 1992 to 2017 for which reliable data was available for all commodity prices. Data on country series was obtained from World Bank World Development Indicators, 2017 edition, and World Governance Indicators dataset. Data on commodity prices was obtained from IMF Econstat database.

Empirical Analysis

Preliminary Analysis

In Table 1 below, we present time series properties of monthly commodity price for sample period. This particular analysis is necessary since lot of issues have been encountered with application of time series data, especially on measurement and aggregation (Stevenson, Muscatelli, & Gregory, 1988). Average monthly prices for all commodities were positive at 94.2 dollars. Focusing on volatility, it became astonishing that standard deviation (SD) for each of price series is less than own means, although they are relatively high. This indicates that for period of study, commodity prices have fluctuated considerably but not too high. The only commodity that is different is that of fuel. The prices have experienced quite high volatilities, considering very high SD. This suggests that oil prices have been most volatile among commodity in recent periods in world market.

We also consider persistence of commodity price data across periods. This was done using autocorrelation tests on data. The first-order autocorrelation is 0.61 for all commodities, 0.566 for agricultural commodities, and 0.873 for fuels. These are really high positive autocorrelation values that show clearly that commodity prices are exceedingly correlated and estimations based on the data need adequate consideration. Again, fuel prices appear to be most correlated and suggest that any shock in prices last for very long periods.

This is perhaps reason why oil producing countries tend to feel shocks in commodity price fluctuations more than any other country (Talvi, Vegh, 2005). Indeed, autocorrelations are high for commodity groups up to fifth-order. For individual commodities, same results are seen, with petroleum oil having highest correlations which also extends up to sixth order. The test statistic for

joint null hypothesis that all autocorrelations are zero for lags 1 through 12 is given by Q_{12}. The value is sufficiently high for each commodities and p-value indicates significance at 1 %. Thus, autocorrelation is quite strong issue in commodity price data in world market.

Table 1. Time series properties of world commodity prices

Quarter	$\bar{c}$	$\widehat{SD}(c)$	$\hat{\rho}_1$	$\hat{\rho}_2$	$\hat{\rho}_3$	$\hat{\rho}_4$	$\hat{\rho}_6$	$\hat{\rho}_{12}$	Q_{12}	p-value
All commodities	94.7	89.2	0.610	0.503	0.217	0.047	0.144	-0.345	43.4	0
Agriculture	108.9	30.5	0.566	0.699	0.538	0.472	0.215	0.041	45.6	0
Fuels	84.8	108.5	0.873	0.704	0.641	0.522	0.302	0.021	69.3	0
Cocoa	1775.4	773.9	0.757	0.465	0.237	-0.091	-0.297	-0.271	36.9	0
Copper	3935.1	3552.6	0.868	0.716	0.591	0.476	0.245	0.03	60.2	0
Oil	46.2	59.9	0.915	0.798	0.691	0.568	0.328	0.035	79.3	0
Tea	234.8	69.7	0.87	0.739	0.65	0.475	0.179	-0.096	61.8	0

Source: Authors' Results

Note: T denotes the number of observations while $\bar{c}$ and $\widehat{SD}(c)$ are the sample mean and standard deviation; the $\hat{\rho}_{is}$ are the autocorrelation coefficients

The trends in monthly commodity prices between 1992 and 2017 are also reported in Figure 1 below. The periods of negative shocks in 1998, 2002 and 2008 have been clearly marked in charts for each of commodities and their groupings. Moreover, highest general periodic height for commodity prices started in 2003 and general high trend has remained for all commodities apart from that of agricultural commodities which fell below the pre-2003 period in 2008 although, it rapidly recovered in 2010. In all, tea prices appear to have experienced most rapid fluctuations without any discernible short term trends observed period.

The series for tea prices seems mean-reverting over time.

In Table 2, descriptive statistics for other variables in our model are reported. The mean output growth for sample of countries used in study is 6.07 which is quite impressive for SSA region, although SD is high which indicates fluctuations either over periods or across countries. The ratio of credit to GDP in region is also high on average at 27.5 %. However, over 1992 to 2013 period, SSA countries had fiscal deficit of -1.7 % of GDP, indicating high fiscal deficits for the region.

The countries are also seen to be very open with trade openness mean of 93.7 % which emphasizes that dependence of SSA economies on external sector. The control of corruption variable is negative, suggesting poor effort at controlling corruption among these countries. The oil rent variable is also high at 24.3 %. These variable indicate poor institutional setups, either largely or mainly with respect to oil sector among African countries.

Table 2. Descriptive Statistics

	Mean	Std. Dev.	Skewness	Kurtosis	J-B	Prob.
Y	6.07	12.32	6.98	75.90	60592.9	0
fpol	-1.17	5.81	1.09	7.70	295.9	0
fdepth	27.52	28.23	1.37	5.12	132.2	0
open	93.75	73.43	2.79	13.61	1579.1	0
inst1	-0.83	0.47	0.15	2.06	10.7	0.00
inst2	24.31	33.58	3.25	18.50	3105.9	0.00

Source: Authors' Results

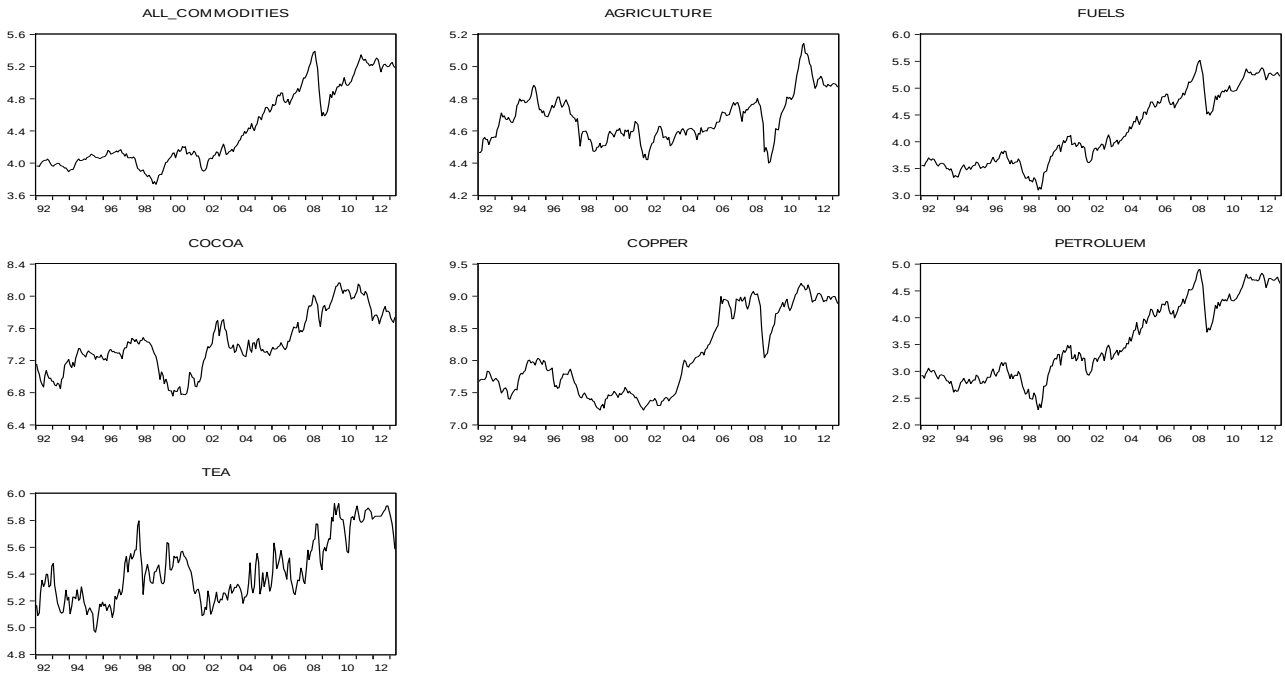

Fig. 1. Trends in Monthly Commodity Prices between 1992 and 2017
Source: Authors' Results

We further test for distribution patterns of density functions for residual by plotting quantiles using Quantile-Quantile (Q-Q) theoretic plot as shown in Figure 2 below. If residuals are normally distributed, points in QQ-plots should lie alongside straight line. In our chart, tails and heads for all commodity prices lie extensively away from line. These indicate that basically, both large negative and positive shocks are driving departure from normality in each variables. Also, results show presence of outliers among data set across countries in sample. This further confirms results from descriptive analysis presented above.

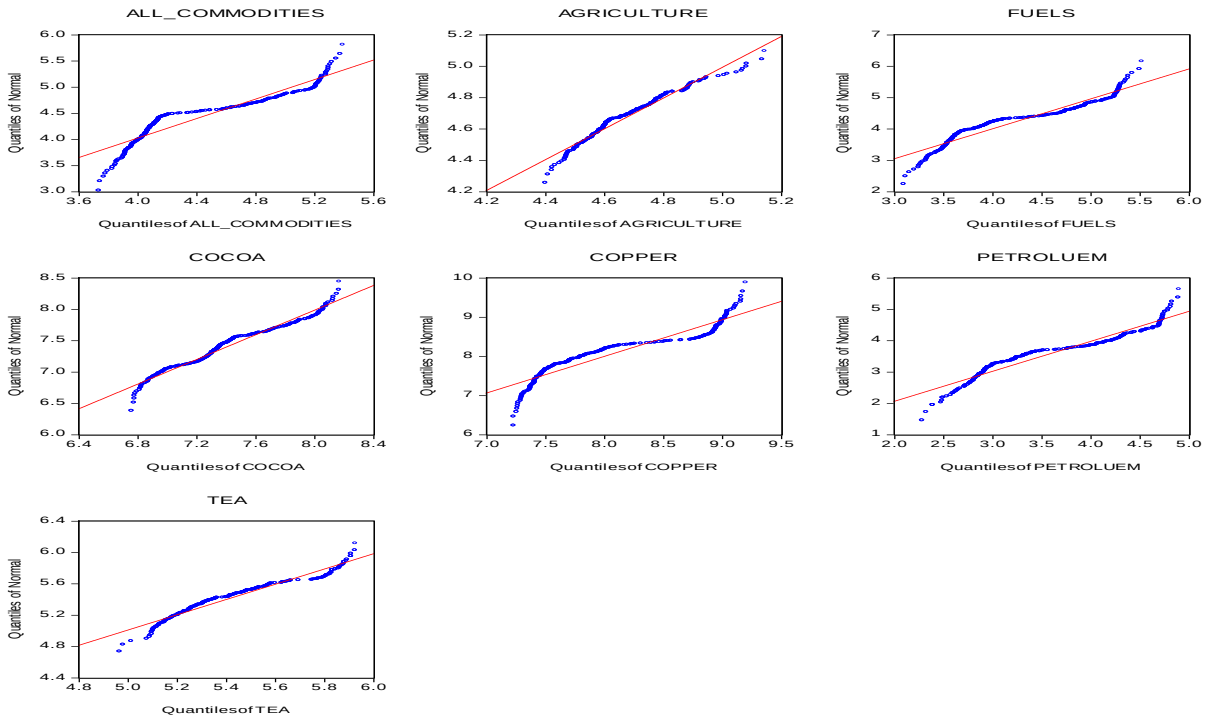

Fig. 2. Quantile-Quantile (Q-Q) Plot
Source: Authors' Results

Unit Root Test Results

Unit root results are presented in Table 3. Null hypothesis of unit roots cannot be rejected when variables are taken in level. These results strongly indicate variables are non-stationary in level and stationary in first differences. This finding is supported by both homogenous and heterogeneous panel unit root tests. However, we reject this hypothesis when series are in first differences.

Table 3. Panel Unit Root Result

	Homogeneous Unit Root Process				Heterogeneous Unit Root Process			
	Level		1st Diff		Level		1st Diff	
Variables	LLC	Breitung	LLC	Breitung	IPS	ADF-Fisher	IPS	ADF-Fisher
Y	11.11	5.32	18.19	-3.00***	4.32	74.56	-16.07***	400.09**
fpol	18.49	14.56	-4.49***	1.74	14.73	30.86	-9.73***	289.4***
fdepth	-3.01	-1.19	-9.69***	-11.85***	-2.45	101.8**	20.18***	475.40***
open	-2.37	-2.30	-20.32***	-17.40***	-1.64	93.50*	-24.51***	602.00***
inst1	-3.42	-3.99	-23.53***	-20.00***	-3.80	127.82	-27.82***	890.95***
inst2	0.63	2.58	-21.05***	-12.16***	0.76	64.37	-19.41***	454.07***
compr	-8.60	-7.33	-22.59***	-15.81***	-7.56	185.47	-27.11***	654.896***

Source: Authors' Results

Note: *** indicates significant at 1%; IPS=Im,Pesaran& Shin; LLC=Levin, Lin & Chu

Co-integration Test Results

Table 4 shows outcomes of Pedroni's and Kao panel co-integration tests on series having used four within dimension and three between-group dimension tests to check whether our panel data are co-integrated. The columns labeled within-dimension contain computed statistics based on estimators that pool autoregressive coefficient across different countries for unit root tests on estimated residuals.

Table 4. Panel Co-integration Test Result

Series for co-integration Test: *fpol, cumpr, ygap, open, fdepth, inst, dummy*					
Within-Dimension			Between-Dimension		Kao (ADF)
	Statistics	Weighted Statistics		Statistics	
Panel v	-2.72**	-3.49***	Group rho	-2.56***	-1.52*
Panel rho	-2.90***	-1.84**	Group PP	-2.73***	-----
Panel PP	-0.85	-2.45***	Group ADF	-2.14**	-----
Panel ADF	13.43	1.27			
Series for co-integration Test: *fpol, cumpr, ygap, open, fdepth, inst, dummy*					
Within-Dimension			Between-Dimension		KAO (ADF)
	Statistics	Weighted Statistics		Statistics	
Panel v	-1.24	-2.30**	Group rho	1.11	-1.40*
Panel rho	1.69	0.40	Group PP	-3.73***	-----
Panel PP	-1.49*	-3.36***	Group ADF	0.52	-----
Panel ADF	0.85	0.13			

Source: Authors' Results

Note: ***. **. * are the level of significance for 1 %. 5 % and 10 % respectively

The T-statistics is written in brackets as stated in each cell.

The columns labeled between-dimension report computed statistics based on estimators that average individually calculated coefficients for each country. Except for v-statistic test, results of within-group tests and between-group tests show that null hypothesis of no co-integration can be rejected. This is also complemented by Kao panel co-integration test whose results are shown in Table 4 with denotation that null hypothesis of no co-integration can be rejected of series

Analysis of Regression Results

The result of estimates for fiscal management among countries in short run is reported in Table 5 below. The results are reported in three sections based on control for price and high price fluctuations. Output gap is positive and significant, suggesting a rise in output gap leads to rise in fiscal deficits. This result is robust across three estimates with control for prices, although coefficient is higher when high price fluctuations are included in estimation.

The result shows that in short run, fiscal managers respond in direction of output gap: with boom inducing escalation in spending while recession induces reduction in spending. This sensation of procyclical fiscal policy management is public among commodity exporting countries where fiscal activities follow same direction with output fluctuations (Talvi, Vegh, 2005; Gavin, Perotti, 1997). Commodity prices has significant negative impact on fiscal deficits. Higher prices leads to lower deficits. This result shows that commodity price movements in itself does not generate procyclicality of fiscal policy in SSA region, rather it is extent of short term responses of fiscal managers to price changes that impact fiscal deficits.

Financial depth has strong negative impact on fiscal deficits suggesting that highly developed financial markets tend to improve ability of governments to manage budgetary funds in short run. The coefficient of institutions is significant and negative indicating that corruption control tends to reduce fiscal deficits (and perhaps fiscal recklessness). Thus, reducing corruption likely reduce extra budgetary spending and indiscriminate fiscal deficits in SSA commodity exporters. The dummy variable of extreme commodity price volatility also impacted negatively on fiscal policy equation.

The coefficient of panel ECM is negative and passes significance test at 1% level. This indicates that short term deviations of fiscal outcomes from equilibrium are restorable in long run. The path for return to equilibrium is stable even when it takes relatively some time for equilibrium to be restored considering the relatively low ECM term. Apparently, shocks to fiscal deficits are quite persistent in commodity exporting countries in SSA.

Table 5. Short Run Fiscal Cyclicality Result

Variable	1	2	3
Δygap	0.05** (2.3)	0.06*** (4.6)	0.05** (2.1)
Δcompr	-0.66** (2.4)	-0.57** (2.7)	-
Δfdepth	-0.16*** (5.6)	-0.15*** (7.1)	-0.13*** (4.9)
Δopen	-0.04 (-1.1)	-0.06 (-1.2)	-0.01 (-0.7)
Δinst1	-0.96* (-1.7)	-1.20* (1.9)	-0.96* (-1.7)
Δinst2	0.01 (0.6)	0.01 (0.8)	0.03 (0.8)
Δdummy	-	-0.86* (1.9)	-
PECM(-1)	-0.40*** (-7.1)	-0.40*** (-6.8)	-0.39*** (-5.5)
Adjusted R-squared	0.13	0.14	0.14

Source: Authors' Results

In Table 6 below, result of output gap equation is reported. Fiscal policy only had impact on output gap after commodity price and its volatility were controlled for. This result suggests that fiscal policy is weak in affecting output gap among SSA commodity exporters, especially when prices are fluctuating significantly.

Consequently, macroeconomic stabilization has not been well captured by fiscal policy among these countries. The coefficients of commodity prices and its volatility are negative and significant, showing that commodity prices may have contractionary impact on output gap among the countries. The coefficient of institutions through corruption control is positive and shows that strong institutional setups that control corruption would ensure impressive growth in output in the short term.

The coefficient of financial depth is negative and significant when price volatility is controlled for. This indicates that financial sector has not had positive impact on output growth for the period in the study among the countries. Moreover, coefficient of panel error correction is significant and negative. The value is high, and suggests that there is rapid approach towards equilibrium, after any short term deviations of output gap within the economies in the sample.

Table 6. Short Run Output Gap Result

Variable	Coefficient	Coefficient	Coefficient
Dfpol	0.07 (1.1)	0.11 (1.4)	0.29*** (8.1)
Dcompr	-0.82 (-1.8)	-0.38* (-1.9)	-
Dfdepth	-0.19** (-2.3)	-0.23 (-2.8)	-0.07 (1.4)
dinst1	6.90** (2.4)	7.61** (2.6)	11.9*** (7.1)
dinst2	0.01 (0.6)	0.03 (1.1)	-0.06** (-2.5)
Dummy	-	-4.83*** (-8.9)	
PECM2(-1)	-0.83*** (-4.3)	-0.62 (-5.1)	-0.69 (-4.6)
Adjusted R-squared	0.34	0.33	0.27

Source: Author's Results

The long run estimates for fiscal cyclicality estimates shown in Table 7 below indicates that fiscal policy is still procyclical in long run, perhaps even with higher virulence. The coefficients of *ygap* variable are significant and positive in each of outputs, and are slightly higher also when commodity prices and its deep volatility are included in our model. Thus, even after all adjustments are made following a change in commodity prices, fiscal policy still acts in destabilizing manner upon commodity price movement. Thus, policy measures have acted to greatly inject instabilities in international commodity markets into economic managements in resource-rich African countries.

Table 7. Long Run Estimates Based on FMOLS (Cyclicality of Fiscal Policy)

Variable	1	2	3
ygap	0.05*** (6.3)	0.06** (2.4)	0.04* (1.8)
compr	0.25	0.04	-
fdepth	-0.11*** (6.4)	-0.04** (-2.1)	-0.04** (-2.4)
open	-0.08 (-2.2)	-0.01 (-0.7)	-0.01 (1.2)
inst1	0.78* (1.9)	0.45* (1.8)	0.57* (1.9)
inst2	0.00 (0.2)	0.01 (0.7)	0.01 (0.7)
dummy		1.08** (2.6)	
Adjusted R-squared	0.34	0.30	0.32

Source: Author's Results

Anew, coefficients of financial development and institutions are significant, although signs of institutions coefficient is rather pervasive. Financial development is thus, strong factor in improving fiscal management among SSA economies since strong financial systems can ensure stable fiscal operations even when external resources are depleting. Conversely, control of corruption variable indicates that in the long run, better institutions might imply higher cost on governments which will be reflected in higher fiscal deficits in these countries.

In long run estimates for output shown in Table 8 below, fiscal policy only manages to be significant at 10 % level when commodity prices and volatility are controlled. Commodity prices and its volatility are shown to exert strong negative impact on output gap. Apparently, changes in prices, especially drop in commodity prices have tendency of widening output gap within SSA countries. Financial depth, are also shown to have strong negative impact on output gap. The results therefore indicate that commodity prices may have long-lasting effects directly on output or indirectly, by weakening fiscal stabilization measures among commodity exporting countries in the SSA.

Table 8. Long Run Estimates Based on FMOLS (Output Gap)

Variable	1	2	3
fpol	0.11 (1.2)	0.17* (1.1)	0.06* (1.9)
compr	-0.15*** (4.3)	-0.13*** (-7.1)	-
fdepth	-0.20*** (-5.1)	-0.18*** (5.1)	-0.14** (-2.4)
inst1	5.13** (2.2)	6.45** (2.1)	4.86 (1.3)
inst2	0.01 (1.1)	0.01 (0.9)	0.08 (2.1)
dummy	-	-3.57** (2.5)	-
Adj. R-squared	0.23	0.26	0.22

Source: Author's Results

3. Conclusion

This study has placed in perspective cyclical stance of fiscal policy in SSA commodity exporters over long period. Although, outline of the study is not exhaustive, it has shown large inconsistency of fiscal policy as countercyclical tool in hands of policy makers and consequent poor effect that fiscal policy has had on macroeconomic stabilization in SSA commodity exporters. The overall outcome in our study is that fiscal policy tends to be procyclical in commodity exporting countries in Africa. Government spending as share of GDP tends to rise during periods of output growth and falls during periods of output slowdown. Three sets of explanations for such puzzling fiscal policy behaviour in SSA commodity exporters are advanced in this study.

The first explanation lies in reliance of fiscal policy on oil revenue streams, combined with international pattern of world economy. Essentially, upward surges in oil prices are usually associated with periods of global economic boom when most oil importers are experiencing increases in industrial production and demand. Such international economic booms often reverberate in SSA commodity exporters also, causing economic prosperity too. Thus, at this period of domestic boom oil prices are also rising. Since government is not certain about the persistence of the high prices, it tends to raise spending.

During periods of global recession however, oil price falls and this reduces revenue to countries. Governments therefore cut down on spending even though the domestic economy is experiencing its own share of the prevailing global recession. This pattern of movements therefore portrays procyclical behaviour of both government spending and the fiscal balance.

Secondly, we allude to 'avarice effect' explanations which are based upon political-economic interactions that explain overspending of transitory shocks or increases in fiscal revenue.

In Tornell and Lane (1998) for example, avarice arises because of fiscal commons problem. If innumerable awareness groups that compete for share of tax revenue interpret fiscal resources as

common pool, each group will be unwilling to reduce its claim on surge in fiscal revenue, having knowledge that such benefits of restraint will generally accrue to other awareness groups. In support of preceding, fiscal fluctuations that frequently escort output fluctuations in SSA commodity exporters can be nosedived if governments in commodity exporting SSA countries should pursue fiscal strategies aimed at breaking procyclical response of expenditure to macroeconomic cycles.

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УДК 33

Фискальное управление и колебания цен на сырьевые товары в странах Африки к югу от Сахары

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Аннотация. Налогово-бюджетная политика в богатой ресурсами стране должна согласовываться с достижением макроэкономических целей, таких как макроэкономическая стабильность и эффективное распределение ресурсов, особенно с учетом ее роли во вливании доли ресурсной ренты во внутреннюю экономику в Африке. Однако зависимость от поступлений от экспорта сырьевых товаров требует финансового управления, бюджетного планирования и эффективного использования государственных ресурсов. Таким образом,

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в данном исследовании исследуются связи между ценами на сырьевые товары и фискальными операциями среди выборки экспортеров сырьевых товаров в странах ЮАР. В статье используются данные за 1992–2017 гг. по девяти богатым ресурсами странам региона SSA, панельная совместная интеграция и полностью модифицированный метод OLS (FMOL) для определения долгосрочных эффектов взаимосвязи. Исследование показало, что эластичность мер налогово-бюджетной политики в отношении спада выпуска была значительной и положительной, что свидетельствует о том, что налогово-бюджетная политика в нашей выборке стран АЮС фактически является проциклической. Более того, установлено, что налогово-бюджетная политика не дает положительных результатов в плане обеспечения макроэкономической стабилизации. Сложность применения мер фискальной стабилизации объясняется нестабильным притоком доходов из-за чрезвычайно нестабильной конъюнктуры цен на сырьевые товары на мировом рынке. Рекомендация авторов в отношении политических мер заключается в том, что правительства стран Юго-Восточной Азии, экспортирующих сырье, должны отслеживать фискальные стратегии, направленные на преодоление проциклической реакции расходов на макроэкономические циклы.

Ключевые слова: цены на сырьевые товары, налогово-бюджетная политика, фискальная процикличность, SSA, динамический OLS.