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Tax Ratio and Output Volatility: Linear Time Series Evidence from Nigeria

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Abstract
This study examines the tax ratio-output volatility link in Nigeria against the backdrop of the poor stabilizing potentials of monetary policy. Annual country-specific taxation and macroeconomic data were sourced from the Federal Inland Revenue Service and Central Bank of Nigeria Statistical Bulletin. Following the usual diagnostic tests, the co-integration and error correction statistical technique were employed in estimating the data. Numerous results of the taxation-output volatility link are mostly consistent with extant empirical literature. However, contrary to the dominant negative relationship between taxes and output volatility, our estimation results show that tax ratio is positively and significantly related to output volatility. It is therefore recommended that the revenue base of Nigeria taxes be increased so as to improve the tax revenue to GDP ratio which was barely 7% in 2013.

Keywords: Output Volatility, Tax Ratio, Openness, Size of Government Political Stability

I. INTRODUCTION

The history of output volatility predates modern civilization. A good account of this is captured in Genesis 41:29-30:

> *…there come seven years of great plenty throughout all the land of Egypt: And there shall arise after them seven years of famine and all the plenty shall be forgotten in the land of Egypt.*

The earliest in the history of modern economy is the Tullip bubble of 1636-1637 which was best explained by the Keynes (1935) "animal spirit" hypothesis. Thereafter, economic bubbles and bursts have become unending ranging from the British 1720-1721 South Sea Company bubble, the British Railway mania of the 1804s, the Japan asset price bubble of the 80s, the United States Stock Market of 1920 to the Western securitisation bubble of 2003-2008 (Jimenez 2011).

Today, economic stability has been recognized as a *sinequano* for high and sustainable growth, development and employment in any country. While output volatility is not restricted to any economy (whether developed or developing), different economies adopts different approaches to curtail the gyration. Before now, the goal of any tax policy was simplicity, efficiency and equity. Economic stability has never featured in any tax policy discuss. The post depression era brought to the fore the supremacy of fiscal policy (taxation) as a tool for checking output volatility. During the moderation era of global economic growth, fiscal policy as a stabilization tool was relegated to the background (Listokin, 2012). But the global recession era revealed that the consensus on the stabilization potentials of monetary policy was built on shaky premise as emphasis shifted to fiscal policy where taxation took the centre stage.

Even as stabilization has come to be recognized as a relevant tax policy objective, our understanding of the relationship between fiscal policy (taxation) economic stabilization has remained largely rudimentary. The question central to this study therefore is: what is the relationship between taxation and output volatility in Nigeria against the backdrop of the banking crisis, depreciating naira value, depleting external reserve, unending political bickering, Stock Market crisis and the fluctuating prices of the Nigeria oil which are all attributable to shocks from global economic crisis.

The fundamental objective of the study is to replicate the taxation-output volatility nexus using country-specific time series data from developing countries with Nigeria as a focal point. We introduced several modifications to the existing studies. We generated taxation and macroeconomic data from 32 years which may be considered very extensive. We deviated from the usual cross-country approach which may be limited not only by the challenge of data quality but also by the likely bias that may be introduced from the omission of relevant variables that may correlate with taxation. We expanded the explanatory variables by testing the impact of corruption on output volatility which to the best of our knowledge may not have been tested in any study.

Majorly, the study established a positive and robust relationship between tax ratio and output volatility signaling that Nigeria tax system increases output volatility. The relationship between total tax revenue to GDP ratio is negative though infinitesimally small to cause any meaningful reduction on output volatility. The reason for this poor output is that Nigeria is a small tax country with average tax revenue to GDP ratio of about 15% which makes the tax system relatively weak.

The outline of this paper is as follows. Section 2 provides a detailed consideration of existing empirics on the taxation – output volatility nexus. Section 3 describes the methodology with emphasis on modeling and estimation techniques. Section 4 presents analysis of the estimation results and section 5 concludes the paper.

II. THE RELATIONSHIP BETWEEN TAXATION AND OUTPUT VOLATILITY

The earliest empirical work on the relationship between taxation and output volatility is the Gali (1994) study which examined the role of income taxes and government purchases as automatic stabilizers in 22 OECD countries from 1960 to 1990. It was discovered that while government size reduces output volatility, income taxes increases output volatility in the sample studied. Building on this study, Fatas and Mahov (2001) examined 20 OECD countries from 1960 to 1997 using regression with instrumental variables to cater for the simultaneity problem of the Gali (1994) study. They established a larger negative effect of government size on output

volatility. In the same vein, Kim and Lee (2007) adopted a Keynesian framework to explain government size and economic uncertainty using a cross section of 15 OECD countries from 1981-1998. They corroborated the earliest position that larger government reduces economic uncertainty even though excessively large government can crowd out resources from the private sector which will affect growth stability (Aisen & Joseveiga, 2010).

On the relationship between taxes and output volatility, there seems to be a consensus on the negative impact of taxes on output volatility even though some few studies have also reported insignificant relationship. Generally, an economic built on progressive direct taxes such as company income tax, will enjoy lesser output volatility compared to economy dominated by indirect tax system (Kubinski, 2007).

Posch (2007), using a stochastic neoclassical framework and focusing on OECD countries between 1980 to 1990 found a negative relationship between company income and personal income taxes and output volatility. The study did not find a relationship between the moderation of United States economy and tax reforms even though the reverse occurred in the case of United Kingdom. Martinez-Vazquez, Vulovic and Lui (2009) found a negative relationship between tax ratio and output volatility. The study was based on a sample of 116 developed, transitional and developing countries between 1972 and 2005. They observed that in developed countries with higher total tax to GDP ratio, the stabilizing power of tax ratio was more. Bejan (2006), Hakura (2007) also found that output volatility was larger in developing countries. However, some studies reported a contrary result on the taxation-output dynamics. Auerbach and Feeberg (2000) and Mongay and Seckkat (2005) reported an insignificant relationship between taxes and output volatility. Weller (2007) found unclear relationship between tax progressivity and growth volatility.

From casual empiricism, outward oriented economies are consistently exposed to external shock resulting in economic instability than closed economy even though some researchers have reported a negative relationship between openness and output volatility. Cavallo (2007) reassessed output volatility and openness to trade and found that the net effect of trade openness is stabilizing. It has also been established that openness reduces the effect of financial crisis and smoothen adjustments to external shocks (Cavo, Izeuierdo & Mejia, 2004; Edward, 2004; Calvo & Talvi 2005). However, Easterly, Islam and Stiglitz, 2001, Beck, Lundberg and Majnoni (2001), Martinez-Vazquez *et al* (2009) found that trade openness is positively correlated with economic volatility, the more exposure to external shock, the more volatile the economy. The banking crisis in Nigeria, depleting external reserves and the stock market crisis are all attributed to the global economic meltdown. Hence, Rodrik (1999:25) states:

> *Just as the advantages of import substitution policies were overstated in an earlier era, today the benefits of openness are oversold routinely in the policy relevant literature and in the publications of the World Bank and the IMF.*

The significant negative relationship between financial depth and output volatility seems settled even though the crash of the Asian tigers and the global finance meltdown cast doubt on the conventional wisdom. Easterly, Islam and Stiglitz (2001) discovered that financial depth reduces output volatility up to a certain level. Beyond the reasonable threshold, financial depth increases economic volatility. This inconsistency according to them results from financial profligacy. In the same vein, Bekaert, Harvey and Lundblad (2004) reported that financial liberalization, a form of openness, leads to lower volatility in consumption growth and output growth. Mediano (2006) examined credit market and macroeconomic volatility using a panel of OECD countries for 20

years and discovered that business cycle model that promotes collateral constraints generates a negative relationship between the volatility of output and size of the credit market. He concludes that increased credit to the private sector makes output less open to volatility.

Bettlingmayer (1998) document evidence, that political instability can increase output volatility as a result of the joint effect of political factors. Political instability is known to adversely affect economic growth. Campos and Karanosos (2007) focused on the economy of Argentina and found that informal political instability (strikes and assassinations) had direct negative impact on growth. In the same vein, Bernal-Verdugo, Furceri and Gudllaume (2013) examined the dynamic effect of social and political instability on output. They discovered a significant negative effect of instability on output. On the relationship between corruption and output volatility, it was discovered that corruption fuels output volatility. Barseghyan and Dicecio (2010) discovered that 1 standard deviation increase in entry costs increases the standard deviation of output growth.

From 1999 to date, Nigeria has enjoyed a relatively smooth transition from one democratic government to another. This may have accounted for the robust negative relationship between the POLSTAB variable and output volatility. This implies that stable democracy *vis a vis* political stability has helped to reduce economic uncertainty in Nigeria. This view is shared by the reports of Bittlingmayer (1998); Campus and karansos (2007) and Bernal-Verdugo *et al* (2013).

III. METHODOLOGY

This study considers co-integration and error correction technique with output volatility as the dependent variable and taxation and other macroeconomic variables as the regressors. For estimation purposes, we use country-specific annual time series data from 1980 to 2011. Output volatility is proxied as standard deviation of annual real GDP growth rate (Blanchard & Simon, 2001; Kent, Smith & Holloway 2005 and Martinez-Vazquez *et al* 2009). A summary of the dependent and independent variables is presented in Table 1 below.

Table 1: Summary of Dependent and Independent Variable

	Variable	Measure	Source	Reference	Sign
1	Output Volatility	Standard Deviation of real GDP growth rate σ_t^{Υ}	CBN	Blanchard and Simon, (2005); Kent, Smith and Holloway, (2005); Martinez-Vazquez *et al*, (2009)	-
2	Tax Ratio	Direct tax/Indirect tax	FIRS	Martinez-Vazquez *et al*, (2009), Mongay and Sekkart (2005), weller (2007)	-ve
3	Government Size	EXP/GDP	CBN	Gali, (1994), Fatas and Mahov (2001), Kim and Lee (2007)	-ve
4	Financial Depth	PC/GDP	CBN	Easterly *et al* (2001), Vein *et al* (2004), Bekkaet *et al* (2004), Mediano (2006)	-ve
5	Political Stability	Dummy 1= Democracy 0= Military		Bettlingmayer (1998), Campos and Karanosos (2007), Bernal-Verdugo *et al* (2003)	-ve
6	Corruption	CPI	TI	Ilaboya (2013)	+ve

Source: Authors Computation 2014

Model Specification

There is hardly any established theoretical foundation on the specification of a model that explains the impact of taxation on output volatility. Therefore, emphasis is on identified variables in the extant empirical literature. The starting point for our specification is the standard analysis of Kent *et al* (2005) and Martinez-Vazquez *et al* (2009). Even though they are both cross-country approach, we modified the models to suit the country-specific nature of our study. The general form of our multivariate regression model is then:

$$\sigma_t^{\Upsilon}(SDGDP) = \beta_1 X_t + \beta \Upsilon_t + \varepsilon_t \qquad \text{(i)}$$

Where:

σ_t^{Υ} = Standard deviation of growth rate of real GDP; X_t = Tax variables; Υ_t = other possible explanators; ε_t = error term; and t = time period (1980 – 2011)

In econometric form, we have:

$$\sigma_t^{\Upsilon}(SDGDP) = \beta_0 + \beta_1 \frac{TDT}{TID} + \beta_2 \frac{TTR}{GDP} + \beta_3 POLSTAB + \beta_4 OPN + \beta_5 \frac{PC}{GDP} + \beta_6 CPI + \beta_7 \frac{EXP}{GDP} \qquad \text{(ii)}$$

Where:

σ_t^{Υ} = standard deviation of growth rate of real GDP; TDT/TID = Tax ratio; TTR/GDP = Ratio of total tax revenue to GDP; POLSTAB = Political Stability; OPN = Openness; PC/GDP = Financial depth; CPI = Corruption perception index; EXP/GDP = Size of government; and t = Time period

$\beta_1, \beta_2, ..., \beta_7$ = unknown coefficient of the variables, it is expected that $\beta_1, \beta_2, ..., \beta_7 < 0$

Estimation Technique

The econometric methodology employed in this study is Johansen co-integration analysis (which helps to establish the long-run relationship among variables), and the error correction mechanism. The choice is premised on the ability to ascertain stationarity and determine causality between variables. The ADF unit root test was employed to test for stationarity based on its relative efficiency and stability of its critical values (Engle and Granger 1987). Preliminary diagnostic tests were also affected.

IV. ESTIMATION RESULTS AND DISCUSSION

Model Diagnostics

Table 2: Correlation Result

	CPI	EXPGDP	POLSTAB	PCGDP	OPN	SDGDPGR	TDT-TIT	TTR-GDP
CPI	1							
EXPGDP	-0.105	1						
POLSTAB	-0.1577	-0.281	1					
PCGDP	0.02382	-0.268	0.2572	1				
OPN	0.13041	-0.292	0.551	0.2271	1			
SDGDPGR	-0.2842	0.0115	0.3057	-0.3655	0.2566	1		
TDT-TIT	-0.0186	-0.238	0.461	-0.4402	0.5674	0.4529	1	
TTR-GDP	0.14117	-0.309	0.5135	-0.1516	0.6521	0.3751	0.704	1

Source: Authors Computation 2014

To address the basic regression assumptions, we focus on multicollinearity and it appears that the variables are linearly dependent. We observed both positive and negative correlations among the variables. Between SD_GDPGR and TDT/TIT, there is a positive correlation of (r=0.012) and a negative correlation of (r= -0.284) between SD_GDPGR and CPI. The correlation coefficient of (r=0.704) between TDT/TIT and TTR/GDP is high but not alarming. But because the variables are individually significant, the problem of multicollinearity is considered low as confirmed by the variance inflation factor In Table 3. None of the variables indicates the presence of multicollinearity as they all had VIF less than 10.

Table 3: Variance Inflation Test

	Coefficient	Centered
Variable	Variance	VIF
C	3159.784	NA
EXP/GDP	0.794144	2.415209
POLSTAB	748.8127	2.462417
PC/GDP	2.125837	1.368854
OPN	0.441017	1.622995
TDT/TIT	74.84007	1.836962
TTR/GDP	2.963687	1.801555

Source: Authors Computation 2014

We tested for normality of the residuals using the Jarque-Bera test statistics. The result in Table 4 with CPI (p=0.150), EXP/GDP (p=0.161), POLSTAB (p=0.07), OPN (p=0.395) PC/GDP (p=0.00), SD_GDPGR (p= 0.00), TDT/TIT (p=0.11) and TTR/GDP (p=0.0035), satisfies the assumption of normal distribution.

Table 4. Descriptive statistics

	CPI	EXPGDP	POLSTAB	PCGDP	OPN	SDGDPGR	TDTTIT	TTRGDP
Mean	1.485	11.55438	0.5625	15.7494	53.84594	24.10888	2.3475	16.59375
Median	1.2	0.495	1	13.21	58.42	6.17	2.16	15
Maximum	2.7	51.12	1	38.59	83.01	272.58	5.66	38
Minimum	1	0.16	0	8.93	14.02	0.004	0.34	8
Std. Dev.	0.5324	15.32773	0.504016	7.05284	16.86092	51.53551	1.377	6.85264
Jarque-Bera	3.7919	4.478459	5.338708	26.9223	1.85742	393.2402	4.31969	11.31838
Prob.	0.1502	0.106541	0.069297	0.00	0.395063	0.00	0.11534	0.003485
Observations	32	32	32	32	32	32	32	32

Source: Authors Computation 2014

With the Ramsey (RESET) test for correctness of functional form, we reject the hypothesis of functional form misspecification short-run estimates in Table 5.

The Bereusch-Pagan test with a high probability of (p=0.985) means homogeneity cannot be rejected.

Test of Unit Root

Table 5: Test for Unit Root at Levels and First Difference

	LEVELS				FIRST DIFFERENCE			
	Intercept		Trend and Intercept		Intercept		Trend and Intercept	
Variable	ADF value	Critical value	ADF value	Critical value	ADF value	Critical value	ADF value	Critical value
CPI	-0.581	-2.96	-2.943	3.56	-6.913	-2.96	-5.782	3.603
EXPGDP	-1.349	,,	-2.427	,,	-5.006	,,	-4.924	,,
POLSTAB	-2.084	,,	-2.798	,,	-6.831	,,	-6.912	,,
PCGDP	-2.318	,,	-0.568	,,	-4.611	,,	-4.932	,,
OPN	-3.089	,,	-3.911	,,	-7.821	,,	-5.110	,,
SDGDPGR	-4.756	,,	-4.703	,,	-4.756	,,	-4.703	,,
TDT-TIT	-4.140	,,	-5.418	,,	-4.140	,,	-5.418	,,
TTR-GDP	-3.693	,,	-3.420	,,	-6.295	,,	-6.490	,,

Source: Authors Computation 2014

This test is designed to establish the stationarity condition of time series variables to avoid spurious regression estimates from non stationary data. The result of the ADF unit root test at levels with intercept shows that OPN (ADF = -3.089), SD_GDPGR (ADF = -4.140), TDT/TIT (ADF = -4.140) and TTR/GDP (ADF = -3.693) all exceeded the critical value of (-2.96) at 5% level of significance and are considered stationary. At levels with intercept and trend, OPN (ADF = -3.911), SD_GDPGR (ADF = -4.756) and TDT/TIT (ADF = 5.418) were stationary. The variables all gained stationarity at first difference both at intercept and intercept and trend since, the ADF values exceeded the critical values in absolute terms.

Test of Co-integration

Table 6: Co-integration Rank Test (Trace statistics)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	Critical Value	Prob.**
None *	0.981631	345.0576	197.3709	0
At most 1 *	0.908045	225.1455	159.5297	0
At most 2 *	0.820189	153.5519	125.6154	0.0003
At most 3 *	0.699599	102.0764	95.75366	0.0171
At most 4	0.689644	65.99723	69.81889	0.0971
At most 5	0.431417	30.89619	47.85613	0.6721
At most 6	0.252355	13.95796	29.79707	0.843
At most 7	0.117654	5.233137	15.49471	0.7836
At most 8	0.048073	1.478011	3.841466	0.2241

Trace test indicates 4 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Source: Authors Computation 2014

Table 7: C- integration Rank Test (Maximum Eigen value)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	Critical Value	Prob**
None *	0.981631	119.912	58.43354	0
At most 1 *	0.908045	71.59369	52.36261	0.0002
At most 2 *	0.820189	51.47546	46.23142	0.0126
At most 3	0.699599	36.07916	40.07757	0.1318
At most 4 *	0.689644	35.10104	33.87687	0.0356
At most 5	0.431417	16.93824	27.58434	0.5853
At most 6	0.252355	8.724818	21.13162	0.854
At most 7	0.117654	3.755126	14.2646	0.8842
At most 8	0.048073	1.478011	3.841466	0.2241

Max-eigenvalue test indicates 3 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Source: Authors Computation 2014

The linear combination of the integrated series was tested for co-integration to show if a long-run relationship exists among the variables of interest. The result of the trace and maximum Eigen value in Table 7 rejects the null hypothesis of no co-integration. Specifically, the trace statistics show the presence of at least four co-integrating equations while the maximum Eigen value confirms the existence of at least three co-integrating vectors.

Vector Error Correction Model

Table 8: Vector Error Correction Model

Variables	COEFFICIENT	STANDARD ERROR	t-Statistics
C	-9.913		
LONG-RUN ESTIMATES			
LOG(TDT-TIT)	3.853	0.369	10.427
LOG(TTR-GDP)	-0.593	0.616	-0.961
LOG(POLSTAB)	-2.468	0.349	-7.082
LOG(OPN)	1.794	1.794	4.201
LOG(PC-GDP)	-0.056	0.504	-0.110
CP1	1.356	0.629	2.155
LOG(EXP-GDP)	-0.622	0.089	-6.972
SHORT-RUN ESTIMATES			
D(LOG(SDGDPGR(-1)))	-0.147	-0.311	0.473
D(LOG(TDT-TIT(-1)))	2.374	1.009	-1.407
D(LOG(TTR-GDP(-1)))	-3.633	2.583	-1.407
D(LOG(OPN)))	-0.332	-1.439	-0.105
D(POLSTAB(-1)))	-0.152	1.438	-0.106
D(OPN(-1))	-0.332	1.091	-0.304
D(PC-GDP(-1)))	-2.803	3.196	-0.877
D(CPI(-1)))	-0.407	2.303	-0.177
D(EXP-GDP(-1)))	0.143	0.519	0.277
C	-0.080	0.452	-0.177
ECM(-1)	-1.123	0.505	-2.222
R-squared	0.451		
Adj. R-squared	0.203		
ARCH Breusch-pagan-Godfrey Ramsey RESET F-statistic	0.988 0.385 0.40 1.822		

Source: Authors Computation 2014

This model is characterised by both differenced and long-run equilibrium models, hence allowing for the estimate of short-run dynamics and long-run equilibrium adjustment process.

The short-run estimation results in Table 8 shows that none of the variables appeared significant. The one (1) period lag of all the explanatory variables with the exception of TDT/TIT and EXP/GDP were negative. The expected negative sign for the ECM (-1) is satisfied and significant at 5% (t= -2.22).

The long-run estimates shows that the explanatory variable of interest (tax ratio) has a positive and statistically significant impact on output volatility with a coefficient of (3.853) and a robust t-value of (10.42). While the finding contradicts the dominant norm of negative relationship (Posch, 2007, Martinez-Vazquez *et al*, 2009), it conforms effectively with the position of Gali (1994) who found a positive relationship between taxes and output volatility. The result shows that higher direct to indirect tax ratio appears to increase output volatility. This is because the Nigerian tax system is relatively small with a total tax to GDP ratio of about 15% compared to 41% of USA and Canada which are considered large tax economies. Nigeria is ranked 170th out of the 189 countries in the Price Water House Coopers (PWC) global ease of paying taxes report. Therefore, it is not surprising that the tax system lacks stabilizing potentials. This view is strengthened by the position of Martinez-Vazquez *et al* (2009) when they reported that the stabilizing powers of tax ratio is low in developing countries such as Nigeria with a low tax to GDP ratio (7% in 2013).

For the other control variables, government size is shown to have negative impact on output volatility. This means the larger the size of government, the less volatile the economy. (Gali, 1994; Fatas Mihov, 2001; Kim & Lee 2007). Trade openness is shown to be positively and significantly related to output volatility with a coefficient of (1.794) and a positive t-value of (4.201). The implication of this is that outward oriented economies are more exposed to external shocks and are therefore more volatile. This is because more open economies are prone to global economic crisis as observed in the previous studies by Edward (2004), Calvo and Talvi (2005), Cavallo (2007), Easterly, Islam and Stiglitz (2001), Beck, Lundberg and Majnoni (2001) and Martinez-Vazquez *et al* (2009) even though some other studies have found a negative relationship between openness and output volatility (Cavo *et al*, 2004; Edward, 2004; Calvo & Talvi, 2005; and Cavallo, 2007).

Extant literature has advanced a significant negative relationship between financial depth and output volatility (Easterly *et al* 2001; Mediano, 2006). Our study corroborated this position to an extent even though the relationship was statistically insignificant though negative, with a t-value of (-0.110). The global financial meltdown and the crash of the hitherto Asian tigers may cast doubt on the truism of the conventional wisdom of significant negative relationship. More specifically, the banking sector crisis which triggered the N25 billion recapitalisation policy of the Central Bank of Nigeria may have affected the poor stabilizing result of financial depth. As expected, the high level of corruption in Nigeria has increased the level of economic uncertainty. The corruption perception index has a positive and significant impact on output volatility with a coefficient of (1.306) and a t-value of (2.155). it shows that more corrupt countries are exposed to economic uncertainty. Barseghyan and Dicecio (2010) document evidence of positive relationship between corruption and output volatility.

V. CONCLUSION AND POLICY IMPLICATIONS

Conclusion

Taxation – output volatility dynamics is well documented in the developed economies of the world but it has received sparse empirical consideration in the emerging economies with Nigeria as a reference point. It is evident that there is need for a holistic reform of the Nigeria tax system with emphasis on the macroeconomic consequences of such reform. From the analysis, the current Nigeria tax system cannot reduce our economic uncertainty. This is obvious from the tax revenue to GDP ratio of about 15% which fell extremely short of countries like Canada and United State with a ratio of above 40%. With a population of about 180 million, Nigeria has the potential to harness enormous revenue from taxation to transform the economy from small to larger tax economy. This can only be achieved with a well developed tax system built on efficient and effective administration.

The nascent democracy in Nigeria should be sustained and strengthened as political stability is negatively related to output volatility. This means the Nigerian democratic system has helped to stabilize the economy to a reasonable extent. Politically stable economies such as Canada and United States are not subject to high output volatility.

In contrast to other prior studies, we introduced corruption as explanatory variable. It was discovered that corruption contributed significantly to the uncertainty of the economy of Nigeria. This further confirmed the poor ranking Nigeria has enjoyed over the years from the world corruption index by Transparency International, World Bank cost of doing business to the PWC ease of paying taxes index.

Policy Implications

This section translates the empirical results of the study into a framework for implementation. First, since a significant positive relationship exists between tax ratio and output volatility, it shows that higher direct to indirect tax ratio has no stabilizing power in the Nigerian economy for obvious reasons: Nigeria has a small tax economy with relatively low tax revenue to GDP ratio, poor and ineffective tax administration, corruption of tax officials and high cases of tax evasion and avoidance. These problems have collectively retarded the stabilizing power of the Nigerian tax system. Therefore, there is need for a qualitative tax reform with macroeconomic consequences. In the year 2012, Nigeria accrued total tax revenue of about N5 Trillion with about $405 billion gross domestic product which translates into about 7% tax revenue to GDP ratio which cannot in any way reduce output volatility. Nigerian tax system needs urgent intervention and the time is now. The transition from democracy to democracy in Nigeria must be sustained. The institutions of governance must be strengthened to ensure effective administration and control. The distinction between the different organs of government must be maintained so as to ensure standard democratic culture. Lastly, corruption in Nigeria must be checked. The anti-corruption institutions such as ICPC, EFCC and the Nigerian Judicial system should be reengineered to be able to face the challenges posed by corruption which has eaten deep into the fabrics of the Nigerian state. The current state of the anti-corruption agencies is appalling as they are unable to prosecute culprits as a result of their status standing and position.

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