Bullion

Volume 36
Number 3 *Vol. 36 No 3 - Vol 37 No. 1 July 2012 - March 2013*

Article 1

3-2013

A framework for oil price benchmark determination: lessons for Nigeria

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A FRAMEWORK FOR OIL PRICE BENCHMARK DETERMINATION: LESSONS FOR NIGERIA

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1.0 Introduction

A sizeable number of oil producing countries including Nigeria are currently confronted with challenges in the management of their fiscal revenues. This is as a result of the volatility of oil prices and uncertainties about the value of resource and timing of revenue in terms of its size and exhaustibility. Several empirical studies have shown that oil abundant countries' output as well as government revenue and expenditure experience higher volatility, undiversified revenue and export base. These challenges are further compounded by the close link between public expenditure and volatile current oil income, thus complicating fiscal management and resulting in macroeconomic instability. The protracted pressure to spend the windfall oil revenue remains another critical issue of fiscal sustainability and intergenerational equity in countries. Thus, fiscal developments in most of these oil revenue countries (ORC) have given rise to pro-cyclical fiscal policy trend. However, the central challenge is on how to manage the volatility in a poor institutional environment like Nigeria that is characterized by weak reputation for fiscal prudence.

Consequent upon these challenges, many countries of the world have become tempted to introduce fiscal rule in order to strengthen the conduct of the fiscal policies, bind the various governments to pre-announced fiscal arrangements, and provide a credible policy framework that will overtime contribute to stability and growth. One of the critical elements of the fiscal rule is the crude oil benchmark arrangement designed to establish sound fiscal management for countries. Owing to the dynamic nature of the world economy, countries' oil-market benchmarks have tended to shift so rapidly over the years. However, the development has long term implications for market-based benchmarks, price convergence effects between several types of benchmarks ranging within the Organisation of Petroleum Exporting Countries (OPEC), and created producers' sentiment on the adoption of oil benchmarks. It is, therefore, of necessity to consider oil price benchmarks with the understanding that long term trends in production capacity favour the Nigeria's fiscal benchmark. Therefore, a numerical oil price benchmark should be set in such a way to create a budgetary discipline for the country. To a greater extent, the benchmark has to be met in a forward looking manner over the medium term fiscal programme given a consistent policy framework.

Experience has shown that Nigeria's fiscal policy remained largely influenced by oil-driven volatility. Since 1970s, both revenue and expenditure have been volatile especially during such periods of 1979-82, 1991-1992 and more recently 2000-2007. The implications of the boom and bust as well as the disruptions to government services had very large swings in the overall oil deficit stance of the government. These developments provide a strong case for Nigeria to run a fiscal rule, whereby the determined oil price benchmark framework will be fully entrenched. In this regard, part of the petroleum fund could be set aside to support the achievement of inter-temporal fiscal policy objectives in the country and, in part, to surmount the infrastructural gap in the country. Evidences have shown that Nigeria's adoption of an oil-price based fiscal rule and strong fundamental policies put in place in 2004 helped to overcome the effect of the global and financial crises in 2008 as it was possible for the country to sustain the momentum of economic growth. One of the major lessons learnt by Nigeria from the fiscal rule syndrome is the strong idea to integrate oil fund utilization within the budget framework, as it was done in countries like Norway.

The conclusion from the various studies conducted in major oil

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resource countries showed that stabilization and savings funds are necessary but not a sufficient condition for achieving long term fiscal sustainability. This is because it all depends on the extent to which the rules of operation are followed in practice. In effect, an attempt will be made to understudy the various benchmarks for fiscal rule in selected region. This will be tailored to achieving a sustainable economic growth. It is expected that a full commitment on the part of government will aid fiscal rules in strengthening public finances and preventing fiscal pro-cyclicality in countries including Nigeria.

The main thrust of the paper is to draw lessons of experience from other selected oil producing countries' benchmark determination preferably the United States of America, United Kingdom and Mexico. The outcome of the study is expected to help in strengthening Nigeria's oil price framework in line with international best practices. To this end, the rest of the paper is structured as follows. Section 2 dwells on the theoretical and literature review on oil-based fiscal rule, while section 3 presents the framework for oil price benchmark determination. Section 4 examines those factors capable of stimulating the determination of oil price benchmarks. Section 5 discusses some lessons of experience for Nigeria, while section 6 recommends and concludes the paper.

2.0 Theoretical and Literature Review

Theoretically, a fiscal rule in a macroeconomic context is described as a constraint on fiscal policy using an agreed numerical limit on budgetary revenue, which is appropriated in a particular year (Kopits and Symansky, 1998). The adoption of fiscal rule or benchmark is expected to create savings for future volatility and reduce fiscal deficits to a targeted level. It is also adopted to enhance credibility of fiscal policy and help in deficit elimination. Thus the overall task of fiscal rules is to ensure fiscal discipline, contribute to price stability, and prepare the ground for long term sustainability of fiscal policy. However, there are clear differences in the basic features of rule-based frameworks across countries. These discrepancies are owing to the varying needs, institutional capacity, and the degree of exposure to global shocks (including large and volatile capital inflows) across country groups.

In determining the oil-price benchmark for countries, it is of crucial significance to identify the physical delivery of crude oil in either spot or futures markets. The formula price to be computed for determining the price of oil shipment must be linked to specific benchmark. Though, there are different types of benchmarks used by countries, they are however, predicated on export destination. Other salient factors for consideration include, among others, the different varieties and grades of crude oil involved. For instance, crude oil pricing could be based on assessed prices such as 'Dated Brent' or financial layers surrounding the physical benchmarks such as Brent Weighted Average (BWAVE) an index calculated on the basis of prices obtained in the Brent futures markets. OPEC reference price constitutes another type of benchmark, representing a weighted average of prices for petroleum blend, which could be adopted for the purpose of estimating oil revenue and mitigating the unnecessary distortions of the annual budgetary processes.

However, refiners adopt different methodologies in determining different prices for the benchmarks. The general formula pricing is $Px = PR \pm D$ where Px is the price of crude x; PR is the benchmark crude price; and D is the value of price differential, which could be set by oil exporting countries or assessed by Price Reporting Agencies (PRAs). In a simple term, the oil price benchmark formula is expressed as $PR = Px (\pm) D$. The common feature of the benchmark is its physical liquidity. Thus markets with low physical liquidity set the price for the market with much higher volume of oil production. This is because at the point of low physical liquidity, the market tends to be thinner as squeezes and distortions become more widespread. Consequently, prices and spreads become less informative and more volatile. It is a common practice to allow parties in the oil deal to agree initially to the price to be set at the time or around the time of loading.

Other essential characteristics of a long lasting fiscal rule include, among others, simplicity, effectiveness, efficiency, flexibility in accommodating exogenous shocks that are beyond the control of the authorities, enforceability as well as transparency in government operations especially in the areas of accounting, forecasting, and institutional arrangements. On the contrary, non-transparent fiscal policy intentions tend to undermine the fiscal rule and do not usually gain the popularity of the masses. The major criterion is for a set of fiscal rules to be consistent internally as well as with other macroeconomic policy rules.

Generally, the adoption of fiscal rules raises a number of concerns. These concerns range from the limitation impose on government's ability to engage in counter cyclical fiscal policy, and the fact that the fiscal rules alone cannot guarantee fiscal discipline except with the strong political commitment to ensure that rules are not circumvented. For an

effective implementation of fiscal rules, the fiscal authority may be required to ensure that prerequisites such as adequate public financial management (PFM) systems, reliable data availability as well as a minimum technical forecasting capacity are taken into consideration. The fiscal aggregates must be predicted with sufficient degree of accuracy in order to prevent the risk of large deviations from the announced fiscal policy stance from undermining the rule's credibility. Fiscal reporting systems should also be properly detailed in terms of aggregates covered and must be sufficiently developed to produce timely end-year reports. This will allow for internal monitoring of the adherence to the rule, and help to alert policymakers on time especially in the event of any policy changes. Both internal and external audit systems must be well designed to allow for effective accountability of public resource utilization.

Proponents of restrictions have argued that limits on fiscal policy are indicative of government's guarantee not to run excessive deficits and create unsustainable levels of debt. These restrictions help to eliminate or at least reduce the likelihood of the fiscal policy giving rise to macroeconomic volatility. For instance, the limits or prohibition on government borrowing from all domestic sources and particularly from the Central Bank were viewed as contributory to stability through the removal of the source of base money creation and eventually inflationary pressures. From the critics' standpoint, an attempt to restrict the fiscal policy may likely create a source of business cycle fluctuations, which could further aggravate countries' recession, Levinson (1998). In a study conducted by Alesina & Bayoumi (1996), fiscal surpluses are larger in countries with tight constraints and that increased fiscal surpluses emanate from reduced or tight spending profile. It further revealed that the balanced budget rules work effectively in limiting fiscal deficits and eventually result in an efficient expenditure structure. However, the common bias associated with the unrestricted fiscal policy is the government's inability to control spending, which often results in persistent and large deficits and consequently, the accumulation of debts. Various studies conducted have revealed that the impact of huge and uncontrollable deficits is severe on macroeconomic stability.

Alf & Lowry (1994) observe that in a circumstance of budget deficits, countries with constraints policy are able to reduce deficits faster through large adjustment in government spending than those without constraint policy. These results further suggest that while balanced budget rules have effect in limiting the size of deficits, they, thus, impose costs to countries' economies because of the large adjustment in government spending that is required during downturns. Wagner & Elder (2002) found that tighter constraints help to save more money during good times by creating rainy-day funds, which is put into use during recessions to avoid large reductions in spending. Other empirical studies also remark that fiscal rules are generally associated with improved fiscal performance. This is because tighter and more encompassing fiscal rules are correlated with stronger cyclically adjusted primary balances. While the above evidence suggests that fiscal rules are correlated with good fiscal performance, cautions must be taken when interpreting the outcome. This is because stronger political commitment to fiscal discipline could lead to both improvement in performance and the adoption of fiscal performance.

In general, economic performances under fiscal rules have been mixed. For instance, at the national level in advanced countries, attempts to comply with fiscal rules contributed to a decline in inflation and interest rates, mitigate the crowding-out of private investment and alleviate the external imbalance. But, in developing countries, in the absence of deep financial markets, restrictions on bank financing or domestic borrowing could be partly accommodated by substantial foreign indebtedness, and could in part, facilitated by the credibility status associated with the implementation of fiscal rules. Thus, compliance with fiscal rules seems to have led to the distortion in the composition of government expenditures or tax increases. On the expenditure side, the brunt of the adjustment is borne by cuts in public investment.

Similarly, evidences on the macroeconomic effects of countries' balanced budget rules are also mixed. While fiscal performance seems to have been responsive to cyclical fluctuations in output through the effect of either automatic stabilisers or of discretionary action, the recent tests show that fiscal rule limits budget flexibility and does not appear to influence output variance, Alesina and Bayoumi (1996). The findings further revealed that the balanced budget rules work effectively in limiting fiscal deficits and eventually results in an efficient expenditure structure.

3.0 Framework for Oil Price Benchmarks

From the standpoint of economic analysis, different crudes in the international oil market attract different qualities and characteristics. These qualities also make it attractive at different prices since they have bearing on refining yields. Owing to these varieties, they are either set at a discount or a premium to a benchmark or reference price depending on the quality or their

relative demand and supply. Consequently, different benchmarks pricing or price markers are currently in use internationally. In the world market today, there are four major international benchmarks used for pricing other crudes: two in the West: the West Texas Intermediate (WTI) in the US and Dated Brent in Europe, and two in Asia -Dubai and Oman. For example, the Brent Crude and West Texas Intermediate (WTI) are adopted as benchmarks by many western oil traders, particularly in the United States. Interestingly, about Two-thirds of the crude oil supplies of the world are priced on the basis of Dated Brent or Brent Blend. Other prominent price benchmarks used in the international market include The Organization of Petroleum Exporting Countries (OPEC) and Minas (Indonesian), among others.

Just like other benchmarks, OPEC uses its basket price to monitor the situation in the global oil market since the Basket price comprised the average of all the prices of the crude oil produced in the countries. It is also used as one of the main barometers for measuring OPEC's success at balancing global supply and demand. It is relevant to remark that the careful approach to budget benchmark price in Nigeria stems from 2008 crisis when oil price fell sharply from US$147 to US$38 per barrel overnight. Presently, Brent crude still serves as the leading global price benchmark for sweet or sour crude from different parts of the world.

Prior 2003, Platt was not considering the issue of backwardation and contango in determining West African and Mediterranean grade price assessment. Then the price assessments simply add/subtract the prevailing market differential against the daily Dated Brent assessment. Since 2003, Platts began taking into account backwardation/contango in the underlying Dated Brent market. Platts incorporated into the market structure all its Dated Brent related spot price assessments by correlating respective loading dates with the corresponding Dated Brent value. The corresponding Dated Brent value is established through trading activity in the Brent swap market. Consequently, the West African grades are assessed for cargoes loading 15-45 days after date of publication. While a cargo size of 950,000 bbl is the standard in the daily assessed grades, part-cargoes are occasionally traded and may be factored into the assessment process.

The underlying market dynamics may also play a role in determining the value of grades. Market backwardation and contango within 18-48 day window is taken into account for price assessment purposes in the case of Nigeria. All West African assessments are on Free on Board (FOB) basis, for loading at each grade's specific terminal. In its daily assessments of West African crude oil, Platts reflects cargo bids and offers that are submitted in full to Platts before a stated time frame. The prices of these bids and offers may be adjusted at a rate of a maximum of 5 cents/barrel per minute.

4.0 Factors Influencing the Determination of Oil Price Benchmark

In the determination of domestic crude oil price benchmark for budgeting, there are varying degrees of endogenous and exogenous factors that influence the pegging of crude oil price benchmark in the Nigerian budgeting process. These include the social and economic objectives of the government, cost of oil production, Joint-Venture Agreement consideration, and production sharing contract, non-oil sector viability and the overall fiscal stance of the government. The interplay of these variables affects not only the benchmark of crude oil for budgeting but the government revenue stream projections in her fiscal planning. Since 2005, the Nigeria budget framework has been anchored on pegging oil price benchmark to certain pricing mechanism in relation to expected but uncertain global economic outlook and conditions. Nigeria's policymakers use the Moving Average Method (MAM) for pegging oil price benchmarks (BOF, 2012).

Some of the other factors considered when determining oil price benchmarks include among others:

❖ **Technical Cost of Operations:** The evolution of Technical Cost initially poised some concerns to oil operators involved in oil exploration in the country. Interestingly the application of modern seismic and drilling technology such as 3D, 4D and directional drilling resulted in the drastic reduction in the technical cost of oil recovery worldwide. In absolute terms, the Nigerian and West African oil players are still the lowest cost production region in the world. Interestingly, the good part of the attractiveness of Nigeria's oil sector is its favorable cost of per barrel production. This could be attributed to the major reserve accumulations per field, high well production rates, relatively shallow wells and the onshore and offshore development environment. Available data reveals that total cost which is the cost of producing a barrel of crude oil comprised T1 (the operating technical cost per barrel) and T2 (the capital cost per barrel) is contained in the Memorandum of Understanding (MOU). Over time the TC has risen gradually from US$4.5/bbl in 1995 to about US$10.8 in 2011, reflecting the OECD inflation rates. This is also factored into the oil

price benchmark determination.

❖ **Seasonal Factors:** This is considered in terms of the rate at which the demand and supply of oil fluctuates throughout the year. If disruptions in production were to occur, this would probably occur during the winter months than any other season. This is typically true of the Brent crude, which is more vulnerable to extreme weather conditions. Demand for oil has a seasonal component. During the summer months demand is affected by driving activities, while during winter period, it is affected by heating-oil needs. These differential demands for two major products of crude oil (gasoline and heating oil) prompt refineries on a seasonal basis to alter production accordingly.

❖ **Transportation cost:** The cost of shipping oil from the delivery point to alternative refineries enters into the pricing structure of the oils under consideration. The WTI futures contracts calls for oil delivery at Cushing, Oklahoma. Since this delivery point is closer to the refineries than the delivery location for Brent (Sullum Voe, Shetland Island), WTI has a slight price advantage over Brent. It further implies that WTI is not likely to be shipped to European refineries. The same applies to Brent oil that is cheaper to ship to European refineries than to deliver it in the USA. In as much as transportation costs structure does not change, one should not expect to see such influences affecting the price spread. In the long run, changes in the cost structure will explain part of the volatility in the price spread.

❖ **United States' Commercial Crude Oil Inventory Level:** USA's commercial crude oil inventories are reported every Wednesday by the US Department of Energy. These reports have a significant effect on the crude oil price. Low crude oil inventories cause uncertainty about the ability of the market to meet demand, which supports higher prices. Conversely, high crude oil inventory levels supports lower oil prices.

❖ **Convenience Yields:** The incremental value of spot prices over future prices after accounting for carrying cost is known as convenience yield. Commodities with a flow of supply which is controlled by seasons or production intensity are subject to seasonal or occasional hoarding of their supply. At such time since it is more profitable to withhold the spot commodity rather than a distance future contract, a large continuous yield will appear. In the case of oil, significant convenience yields will exist because of supply disruptions due to related political events or incidence. If convenience yields are part of observed futures prices in both Brent and WTI futures markets, their price spread will be due to relative changes in the two convenience yields, all thing being equal, and

❖ **Price Volatility:** The volatility of price changes of the underlying cash commodity is a major determinant of the variability in convenience yields. As in the case of call option, the greater the volatility in the cash commodity, the greater the chance that the cash price will exceed the future price and thus the convenience yield will be greater. By affecting the size of the convenience yields, the cash volatility is expected to affect the price spread directly.

Methodology

On the basis of this analysis, we apply the model hitherto adopted by Hong and Lin (2011) with inclusion of some other variables to first of all determine the UK Brent Dated before zeroing for Nigerian Bonny Light price benchmark. Data were sourced from the International Energy Agency (IEA), Central Bank of Nigeria (CBN) Annual Report, from various issues and Petroleum Intelligence Weekly(PIW). Due to the unavailability of data for some variables considered in the model, we then made use of data from 1986 to 2010. In addition, 1986 was chosen as the period when Memorandum of Understanding(MOU) was initiated. The result of the stationarity (unit root) indicates that the CHEAT variable was stationary at second difference, and the same order of integration was recorded in respect of OPEC quota and OECD demand variables. Overall, the ECM was stationary at level, implying that the variables are cointegrated.

RESULTS OF THE STATIONARITY (UNIT ROOT) TEST

Variables	ADF Stat.	Critical Values		Order of Integration
OPEC Quota	6.016094	1%	(4.374307)	
	0.0003	5%	(3.603202)	Stationarity at 1st difference
		10%	(3.238054)	
D(OECDD)	5.425293	1%	(4.374307)	
	0.01	5%	(3.603202)	Stationarity at 1st difference
		10%	(3.238054)	
USIMPT	-8.980001	1%	(4.416345)	
	0	5%	(3.622033)	Stationarity at 2nd difference
		10%	(3.248592)	
CHEAT	4.681115	1%	(4.356068)	
	0.0048	5%	(3.595026)	Stationarity at 1st difference
		10%	(3.233456)	
ECM	-6.442021	1%	(2.647120)	
	0	1%	(2.647120)	Stationarity at level
		5%	(1.95910)	
		10%	(1.610011)	

Finally, we estimated the UK Dated price function and reported the regression results as presented below:

$P_t = \beta_0 + \beta_1 quota_t + \beta_2 cheat_t + \beta_3 OECD_t + \beta_4 usaimpt + \varepsilon_t$

Where,

P_t = Brent Dated price on yearly basis,

$quota_t$ = OPEC Production quota

$cheat_t$ = Difference between OPEC production and OPEC quota

$OECD_t$ = OECD crude oil demand

$Usaimp_t$ = Share of imported crude oil by the US

ε_t = error term.

Dependent Variable: UKBRENT
Method: Least Squares
Sample: 1986
2012
Included observations: 27

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CHEAT	-0.006369	0.007147	-0.891097	0.3825
OPECQUOTA	0.013174	0.003607	3.652512	0.0014
OECDDD	6.572913	1.181414	5.563599	0
USAIMPT	-0.092466	0.029596	-3.124244	0.0049
C	-287.3476	46.55458	-6.172273	0

R-squared	0.697589	Mean dependent var	38.88926
Adjusted R-squared	0.642605	S.D. dependent var	30.97773
S.E. of regression	18.51926	Akaike info criterion	8.841075
Sum squared resid	7545.185	Schwarz criterion	9.081045
Log likelihood	-114.3545	Hannan-Quinn criter.	8.912431
F-statistic	12.68718	Durbin-Watson stat	1.213752
Prob(F-statistic)	0.000017		

Using the Ordinary Least square regression, the static model result shows that the Probability □ F-stat = 0.000017, while the R- Squared = 0.6976 and the Adj. R- Squared = 0.642605. From this table, It was clearly observed that except that the cheating by OPEC members was not significant in the model, other tested variables appeared significant in the model as the coefficients move in tandem with the a priori expectations. We may have to rely on the results based on the OLS regression. It is a fact that those variables that are significant supports the hypothesis of the relevance of Brent Dated crude in determining the benchmark for the Nigerian crude. Consequently, the formula used in calculating the physical benchmark of an oil shipment is depicted thus:

$$P_X = P_R \pm D$$

Where: P_X = Price of crude X

P_R = Benchmark crude price

D = Value of price differential

The value of price differentials could be set by oil exporting countries or assessed by PRAs. Countries use different benchmark depending on the destination. The pricing may be based on assessed prices such as Dated Brent or on financial layers surrounding physical benchmark such as Brent weighted Average (BWAVE) i.e. index calculated on the basis of prices obtained in the Brent futures market. Thus,

Table1:

Main Benchmark Used in Formula Pricing

	ASIA	EUROPE	US
Saudi Arabia	Oman & Dubai	BWAVE from Jul.'00	ASCI from Jan. 2010, WTI until Dec. '09
Iran	Oman & Dubai	BWAVE from Jan. ' 01, Dated Brent Until Dec, ' 00	
Kuwait	Oman & Dubai		
Iraq (Basrah Blend)	Oman & Dubai	Until Jun. '00	WTI
WTI Second Month			
Nigeria	Dated Brent		
Mexico (Maya Blend)		Dated Brent X 0.527 +3.5%HSFO X0.467 -1%FO X .25 + 3.5% fo X0.25"	WTS X 0.4 +3%HSFO X 0.4 +LLS X 0.1 +Dtd. Brent x 0.1

Assuming that Nigeria is intending to determine the benchmark for 2014, using the given scale,
P_{t+1} = PR +/- D (Brent Dated minus Bonny light price). Assume that the 2013 averaged UK Brent is US$120.0, while that of the Bonny Light stood at US$110.85 a barrel. Therefore in 2014 for instance: PR + (UK Brent price in 2013 minus Bonny light price in 2013) results as follows:

= US$120.0*0.527= PR +/- (US$120.0 – US$110.85)

= US$60.61 = PR +/- (9.15)

= US$60.61 +/- 9.15 = PR

= The price benchmark of Nigerian crude is expected to range between US$54.09 and US$72.39 a barrel in 2014.

5.0 Lessons for Nigeria

Countries including Nigeria make significant use of oil price benchmark in determining the budget for the every fiscal year. It thus serves as as one of the important lessons for countries because the use of oil price benchmark gives room for the identification and assessment of the price of key benchmarks in the international market. For example, the WTI, the Argus Sour Crude Index (ASCI) price, Dated Brent and Dubai that features in the international oil market. This is unlike futures market where prices are observable in real time, hence, the reported prices of physical benchmarks are identified or assessed. These assessments are carried out by oil price reporting agencies particularly Platts and Argus.
Other lessons include the experiences of the fiscal stance by most of the countries. Oil price benchmark helps to demonstrate the value of fiscal prudence considering the realization of macroeconomic stability. From indication, governments in these countries refrained from spending indiscriminately to satisfy political pressures and create unprecedented popularity gains. Instead, they are able to run balanced budgets for their countries. Thus, the fiscal prudence helped them to prevent the "Dutch Disease" and inflation syndrome;

Oil price benchmarking by many countries have expose countries to the need to limit their fiscal spending and possibly intensive efforts at averting fiscal pro-cyclicality as one of the significant priorities tht countries must imbibed.

Another lesson of experience that can be drawn from countries' use of price benchmark is the tenacity to use the oil windfall derived during the boom period to develop critical human capital, social and economic infrastructure. These developments have enhanced industrial competiveness by

minimizing the cost of doing business in those countries. The strict adherence to the use of local contents by indigenous firms in the oil and gas contracts helped to enhance competitive environment with the foreign counterparts. It was also a means by which technology transfers was facilitated to local firms since it is one of the prerequisites for licensing overseas firms, hence gave increased credence to the indigenous firms as they increasingly becoming exposed to new forms of technology.

Generally, the oil price benchmarks play a major role in the oil price discovery process for most of the crude oil sold in both the spot and term markets. More importantly, they make referencing of types of crude easier for sellers and buyers in the market and provide greater opportunity for increased trading and market liquidity. They also provide the main marginal pricing signals for the world oil industry. Theoretically, sellers of crude use the marginal pricing as the last barrel that comes to the markets in determining the price of all barrels on daily basis. Nevertheless, the oil price benchmarks form integral part of crude oil pricing methodologies and they are critical variables used in defining spot values of related crude oils and term contract price formulae. More importantly, the benchmark prices are mostly used by oil companies and traders to price cargoes under long term contracts or in spot market transactions, for future exchanges for the settlement of derivatives instruments such as swap contracts and by government for taxation purposes.

6.0 Recommendations and Conclusion

The adoption and commitment to oil price benchmarking within the rule-based fiscal regime in countries including Nigeria has greatly enhanced the predictability, prudency and counter-cyclicality of revenue. The oil benchmark fiscal rule should be strictly implemented to provide a buffer in the economy of oil exporting countries especially during the period of declines in revenue. The implementation of the SWFs should be sustained as many countries have used the stabilization measures to achieve macroeconomic stability and enhance intergenerational equity. As noted in country like Norway, it uses the earnings from investments of SWF to finance its budget. There is therefore, the need for a clear legal framework that will guarantee consistency and transparency in the management of the fund. The creation of the fund is expected to provide avenue to build savings and insulate the economy from the boom and bust cycles. Part of this fund could be disbursed to service debt, build infrastructure, sustain public expenditure or finance fiscal stimulus when prices of oil dwindled, while the other part of the fund could be invested for intergenerational transfers.
Government should provide support for institutions or better still, establish special fiscal agencies to provide analytical inputs notably high quality macroeconomic forecast and regular assessment of budgetary impact of measures taken by the government. This will help in identifying the weaknesses in fiscal institutions and procedure, and limiting agency problems by increasing accountability to the citizenry.

There is need for operational integrity through ensuring political commitment, transparency and accountability as these are evidences to prove to foreign and domestic investors that countries' fiscal policies are prudent at a certain level of GDP, and proactively conceived in line with international best practices. The template for the oil price framework should be made simple and easy to calculate such that every stakeholder buys into the process. The roles, functions and accountability of different actors involved in the determination of the oil price benchmarks and implementation should be clearly and transparently defined.

There is also the need to review the law governing the upstream fiscal regimes, particularly in the areas of production sharing agreement, off-shore exploration, and the various taxes, which must be in tandem with the international laws and convention. The Petroleum Industry Bill (PIB) should be fast tracked in order to give legitimacy to activities in the sector and attract foreigners and local entrepreneurs.

It is also evident that commodity producers in developing countries are increasingly relying on hedging programmes to mitigate the exposure to price volatility. The use of market based instruments such as (option, features forward contracts) to manage price risk should be integrated. These financial instruments would make it possible to lock-in the (minimum) price agreement during a given transaction periods. It will also make it possible to hedge against price fluctuations and irregularities that often characterized the pricing structure. This could be explored given the understanding of the market dynamics.

In conclusion, the crux of lessons learnt from the reviewed countries' economies is that a pursuit of an impressive fiscal performance will facilitate the creation of a stabilization fund. By insulating public spending from short-term price fluctuations and business cycle, the adherence to fiscal rule, is expected to engender fiscal discipline and macroeconomic stability. Even though, Nigeria has adopted the rule-based fiscal policy, the country is still finding difficult in sustaining fiscal discipline through effective public accountability and transparency. This is due to the weak political commitment

coupled with the fragile institutional arrangement which in effect remains the bane of the country's fiscal management. From indication, there is no means for countries other than to rekindle their political commitments to the oil price benchmark fiscal rule as this is the only way through which the country can provide a buffer for the economy especially during the period of boom-bust cycles.

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