Evaluation of True Government Take under Fixed and Sliding Royalty Scales in Nigerian Oil Industry

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Abstract: Fiscal regimes are very important in the global Petroleum Exploration and Production (E&P) industry. They sharpen policies, management strategies and revenue (take) by governments while defining the attractiveness of the industry to investors. One of the major parameters in fiscal regimes is royalty oil, which could be fixed or adjustable on a sliding scale. Nigeria, which has used fixed royalty scale since the first oil in 1958, is now proposing a change to the sliding royalty scale method within a general review of the country's fiscal regime terms. This study investigated the impact on Government take of a change to sliding royalty in both Joint Ventures (JV) and Production Sharing Contract (PSC) arrangements. Generalised cash flow models to evaluate true government take were developed under conditions of royalty scales based on either or both oil price and volume of production. The results show that government take under sliding royalty scale rates compared favourably with take under fixed royalty rates. However, sliding royalty rates calculated based on both oil price and volume of production yield higher government take than those based on either volume of production or price of oil alone.

Key words: Fiscal terms, Government Take, oil royalty, Joint ventures, Production sharing contracts

INTRODUCTION

Over the past three decades, the Nigerian economy has been heavily dependent on the petroleum sector, which accounts for about 95% of export earnings and 85 % of government revenues. The current oil reserves of about 36 billion barrels has actually witnessed about 200 percent of replacement of produced reserves and compares favourably with the global reserve replacement rate of about 180 percent during the past three decades (Iledare, 2004). However, the Nigerian gas sector, with reserves of about 232 Tcf is still largely undeveloped due to limited infrastructure. In order to continue to grow the E&P sector in Nigeria and subsequently the economy, the revenue accruing to government and the manner in which E&P activities are funded are of great significance.

A fiscal regime can be defined as the framework which the Government of an oil producing country employs in managing, regulating and sharing the revenues that accrue from all the stages of exploitation. It is a key factor in decision making both by host governments and investors. According to Iledare (2004), fiscal systems determine equitably how costs are recovered and profits are shared between firms and the host governments. They shape government's policies necessary for smooth operations in the industry and vary from country to country.

Factors that determine the attractiveness of fiscal regimes to investment includes: government take and its timing, stability of the fiscal regime, ability to adapt to changing circumstances and the disposition of the fiscal regime to attract re-investment from already existing investments (Kemp, 1987).

In Nigeria, the proposed Petroleum Industry Bill (PIB) represents a shift from the fixed royalty scale regime to a sliding royalty scale. Royalty is always prominent in petroleum fiscal terms because it is predictable, simple to administer and provides early revenue stream as soon as exploitation begins The proposed PIB has been classified into pre-discovery provisions, post-discovery contract terms, profit based elements, and government participation options (Iledare, 2010). While the pre-discovery rentals and bonuses include contract-specific signature bonuses and rental rates for the three classes of licenses and leases: the petroleum exploration license (PEL), the petroleum prospecting license (PPL) and the petroleum mining license (PML), the post-discovery provisions comprise mainly of royalties and crypto taxes. In the PIB, royalty payments for both the joint ventures (JVs) and production sharing contracts (PSCs) are to be calculated on a sliding scale based on volume of production and oil price. The sliding scale royalty rates are designed to adjust automatically on the basis of geographical location, daily production, and economic circumstances.

The crypto taxes in the proposed PIB include: education tax to fund industry institutions (maximum of 2% of fiscalised crude oil) and 3% of annual capital budget as contribution to the Niger Delta Development Commission (NDDC).

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Post-discovery profit-based taxes comprise the Corporate Income Tax (CITA) and the Nigerian Hydrocarbon Tax (NHT). Tables 1 and 2 show the fiscal terms under the current JVs and PSCs respectively while Table 3 gives details of the proposed sliding-scale based fiscal terms in the PIB.

Contrary to the widespread belief that the fiscal regime for oil and gas operations as proposed in the PIB will significantly increase government take, a study by the International Monetary Fund (IMF) suggested that the policy could actually lead to a reduction in revenue (Thomas, 2003). The objective of this study therefore is to evaluate and compare government take under the proposed sliding scale rates with the take under the current fixed royalty rate scale.

Literature Review:

The impact of fiscal systems on the economics of non-renewable resources production has received attention from many researchers. In 1984, Slade (1984). examined the impact of tax policy on the supply of exhaustible resource using numerical technique to analyze a variable profit function for a particular copper producing firm. She found that taxation tilt the extraction while affecting cumulative ore extraction and concluded that the imposition of royalties has the opposite effect from what is often intended.

Kemp (1992) in 1992 studied the efficiency of petroleum fiscal systems in UK, Norway, Denmark and Netherlands in collecting the prospective economic rents from the development of new fields where there are uncertainties regarding development costs and oil prices. Using a financial modelling approach, he observed that the fiscal system in UK and Denmark are progressive in relation to development cost variations and oil price changes. The government take is generally tolerable and the system is unlikely to deter the development of new fields. In Norway, the system produces a significantly high level of take, with little incentives for small fields and the system is regressive at 10% real discount rate. In the Netherlands, the system is moderately progressive in current money terms, but regressive in present value terms. He opined that this was the consequence of the gross royalty plus the modest pace of depreciation permitted.

Boyd and Khosrow (1994) have examined how energy cuts, offset with income tax increase affect production, consumption and total welfare in the Philippines. Using a general equilibrium approach, they showed that energy tax cuts expand the energy sector but decreases output of the manufacturing sector regardless of the level of energy tax reduction. This agreed with an earlier empirical study which concluded that taxation impact on the economics of natural resource production. Razavi in 1996 looked into the issue of financing oil and gas projects in developing countries. He observed that governments can facilitate investment in the petroleum sector by establishing clear regulatory and fiscal regimes. He also noted that substantial reward can be achieved through transparent and stable policies. In 1998, Osmundsen (1998) developed a model of dynamic taxation of non-renewable natural resources. In a two period model, it was shown that specific cost characteristics of non-renewable natural resources extraction could distort both the extent and the pace of extraction.

Iledare (2004) has analyzed the impact of petroleum fiscal arrangements and contract terms on petroleum exploration and production economics and host government take in Nigeria using a discounted cash flow model of a hypothetical field. He observed that government participation in E&P ventures in Nigeria through Joint venture arrangement neither optimized economic gains for E&P firms nor maximized the fair market value of petroleum resources received by the government. He found strong evidence to suggest that PSC arrangement can be more favourable to E & P firms in terms of economic returns than JVs under the fiscal terms of the study.

Similarly, Drazen (2000; 2002) has noted that since effective fiscal rules can be used by policymakers as a signaling device to make commitment to creative accounting for meeting targets, their design and transparency of implementation is paramount. Thomas (2003) in his work stated that Nigeria faces two challenges when formulating fiscal regimes. In the long-run, there is need to ensure that the fiscal terms are compatible with the sustainable use of depleting oil and gas resources, while in the short-to-medium-run, there is need to prevent the revenue volatility from spilling over into the budget.

In 2004, Kaiser and Pulsipher (2004) analyzed the effects of fiscal regimes on offshore E & P project economics. The deepwater Gulf of Mexico was used as a case study to show the impact of concessionary arrangements while deep water Angola was used to show the impact of fiscal terms on contractual arrangements. In 2006, Iledare and Kaiser undertook a robust analysis of the impact of petroleum fiscal regime on offshore E & P project economics and take statistics. A cash flow simulation model incorporated with regression analysis was developed and applied to derive relationships to specify how net present value, internal rate of return and government share of rent vary as a function of the system parameters. The study showed that contractor take increase with an increase in price and profit oil and falls with the royalty and tax rate. The study also showed that the profit oil split is a more significant parameter than cost recovery.

In 2008, Pedro (2008) analysed government take and petroleum fiscal regimes under three different types of petroleum arrangements: concessions, production sharing contracts and risk service contracts and found out that depending on the details of the fiscal system, government take can be exactly the same under the three arrangements. In 2009, Isehunwa *et al* (2009) analysed the effects of fiscal terms and contractual agreements on government take in Nigeria oil industry using a generalised cash flow model. The results show that from economic consideration, JV's yield higher government take than PSC's under the current fiscal terms and government take is more sensitive to tax than to royalty rates. In 2010, Iledare (2010) evaluated the proposed Nigerian PIB and the impact on offshore economics and Take Statistics. He observed that in order for the PIB to be a dynamic and stable fiscal arrangement, it must include contract terms and instruments that will willingly give up an appropriate proportion of economic rents to investors to guarantee sustainable capital investment flow for resource development. Where exploration risks are low and geological prospects are high, the government can however capture high economic rent. However, all stake holders must keep a long term view on fiscal terms for project efficiency and equity.

The conclusion from the foregoing review is that the type of agreement between the host government and an operator of an exhaustible resource venture is not the issue; of more importance is the structure of the agreement and fiscal arrangement within that agreement (Al-atter, 2005; Johnston, 2003; Kopits, 2001; Pedro, 2008).

Cash Flow Model:

Using a method similar to Isehunwa *et al* (2009) simple but generalised cash flow models for calculating True Government Take were formulated in order to know the effects of the fiscal terms (Royalty, Tax, Equity share, etc). The models do not account for income from gas sales and condensates but for oil alone.

Cash Flow For Production Sharing Contracts
The cash flow models for PSCs are expressed in equations (1)-(3).
Government take (GT) when Royalty is based only on oil price, is given as:

$$GT = [(s + a - as)(1-Rv - z + zRv) + (Rv)] GR \tag{1}$$

While GT when Royalty is based on volume of production is:

$$GT = [(s + a - as)(1-Rpv - z + zRpv) + (Rpv)] GR \tag{2}$$

GT under concurrent taxation such that Royalty is based on both oil price and volume of production is given as:

$$GT = [(s + a - as)(1-Rv-Rpv - z + zRv+zRpv) + (Rv+Rpv)] GR \tag{3}$$

Cash Flow Model For JVs
Similarly for joint ventures, when royalty is based on oil price, GT is gives as:

$$GT = ((y+a-ay)(1-Rv)+(Rv)GR-(y+a-ay)EXP \tag{4}$$

GT when royalty is based on volume of production can be expressed as:

$$GT = ((y+a-ay)(1 - Rpv) + (Rpv)GR- (y+a-ay) EXP \tag{5}$$

While GT when royalty is based on both Oil price and Volume is given as:

$$GT = ((y+a-ay)(1-Rv+Rpv) + (Rv+Rpv) GR-(y+a-ay) EXP \tag{6}$$

RESULTS AND DISCUSSION

Tables 1 and 2 show the current fiscal terms in the Nigerian oil industry under PSCs and JVs respectively, while Table 3 shows the terms under the proposed sliding royalty scale. For the comparative study, equations (1)-(6) have been used to evaluate the Government take. For PSCs, the limits used under the current fiscal terms are: 50% tax, 16.67% royalty, and 100% cost recovery while under the proposed terms, the limits are 60% tax, 25% royalty and 80% cost recovery. Similarly for JVs, the current fixed terms are: 85% tax and 20% royalty rates, while the proposed terms are: 80% tax and 25% royalty rate. In Nigeria, most PSCs are in shallow or deep waters while most JVs are located onshore.

Figure 1 shows Government Take under JVs at various equity shares. It is in agreement with one of the observations of the world bank that the proposed terms could lead to loss of revenue to government in some areas. Tables 4-6 show government take under different conditions in both JVs and PSCs. Current oil prices and production levels have been assumed. Table 4 shows that government take during the early years of exploitation under the PSC arrangement increases substantially from about 20% to 29 and 37% in deep and shallow waters respectively. This substantial increase is due to the reduction of cost recovery limit from 100 to 80 % in the proposed arrangement.

Figures 2- 4 show Government take under PSCs for deep waters offshore. It is clear that government take is very sensitive to cost recovery. As demonstrated in Table 6, the government take at the start of production when cost recovery of 80% or 100% is allowed, will be different from government take at later years when cost oil is a little fraction.

In general, sliding royalties based on both oil price and volume of production yield higher government take than those based on either volume of production or price of oil alone. Furthermore, government take was observed to be higher in onshore and shallow waters than in deep waters. This is due to the higher tax rates of 80% in onshore and shallow waters, and 60% in deep waters, and not really due to the sliding royalty scales. Government take under current fixed royalty terms tends to compare favourably with the take under the proposed fiscal terms that use sliding royalty rates and confirm observations by earlier investigators.
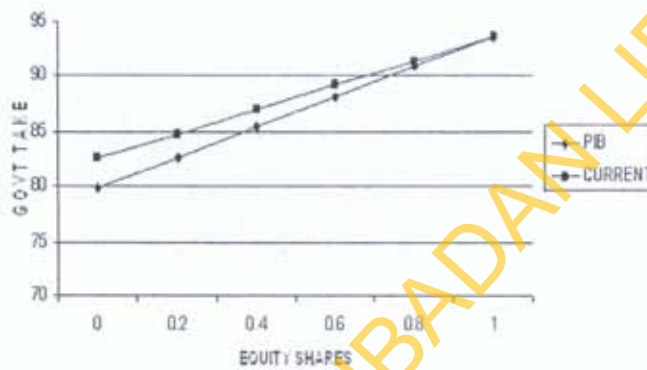

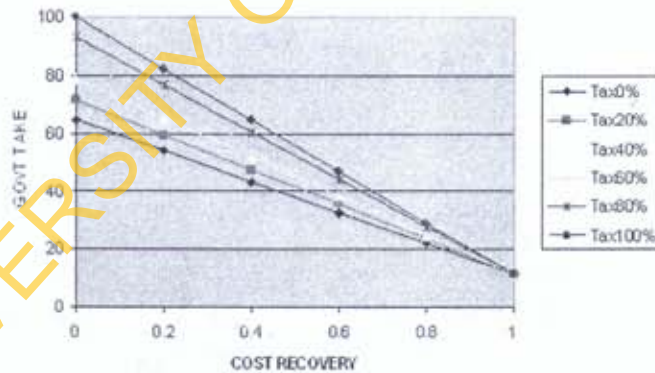Fig. 1: Government Take in JVs under Current and Proposed Fiscal Terms.

Fig. 2: Government take under PSCs with royalty based on volume of production (Deep waters offshore).
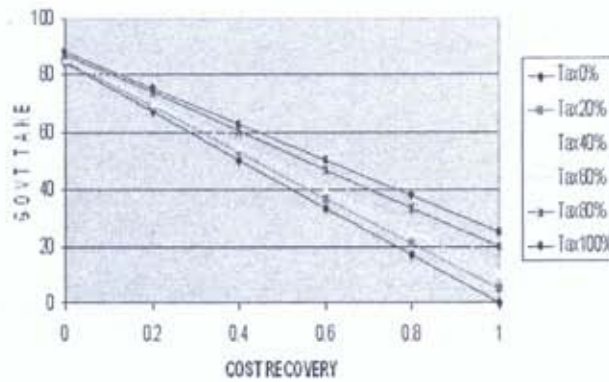
Fig. 3: Government take under PSCs with royalty based on Oil price only (Deep waters offshore).
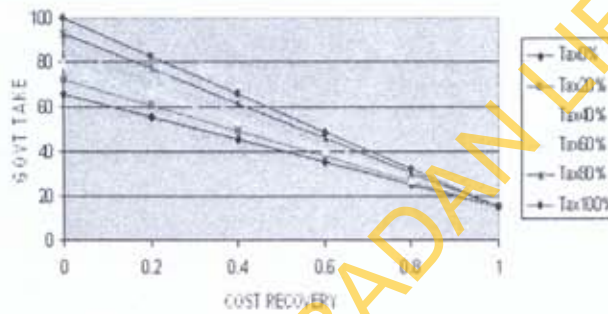

Fig. 4: Government take under PSCs with royalty based on Both Oil price and volume of production (Deep waters)

Table 1: Current Fiscal Terms for JVs in Nigerian oil Industry (Isehunwa, 2009)

Petroleum Profit Tax	85%
Depreciation	Five-year straight line
Deduction	Operating Expenditure
	Capital Expenditure
	Investment allowance (5-30%)
Consolidation	All E&P Expenditures in joint venture areas
Royalty	20 % onshore
	0-18.5% offshore
MOU	Guaranteed after tax margin of $2.3 or $2.5/bbl

Table 2: Current Fiscal Terms for PSCs in Nigerian Oil Industry (Isehunwa, 2009).

Signature Bonus	$0.5-1.00 MM/block
Bid Bonuses	$10-30 MM/block
Royalty Oil	0-16.67 % (subject to water depth)
Cost Recovery	100% after Royalty
Depreciation	5 year Straight Line
Profit Oil (Government Share)	Niger Delta-60% (<30 MBD) to 65% (>50 MBD)
	Frontier: 20% (<350MMB) to 60% (>2BBL)
Petroleum Profit Tax (PPT)	50%
Consolation	Ring fence for PSC, All E&P for PPT

Table 3: Proposed Fiscal Policies in the PIB (Iledare, 2010)

NIGERIA HYDROCARBON TAX (NHT)	
Onshore/Shallow water	50%
Deep water	30%
COMPANY INCOME TAX (CITA)	
Onshore/Shallow water	30%

Table 3: Continue.

Deep water		30%	
ROYALTIES			
Based on Price of Oil			
Oil Price		Rates	
$0-$70		0%	
$70-$110		16%	
$110-$140		22%	
$140-$170		25%	
Above$170		25%	
Based on Volume of Production (Onshore)			
Productions		Rates	
0-2000b/d		5%	
2000-5000b/d		12.5%	
Above 5000b/d		25%	
Government Equity Share		60%	
Cost Revovery Limit		80%	
Rentals		Year	Rate/ Km²
	PPL	2	$100.00
		4	$300.00
		5	$500.00
	PML	All	$1000.00

Table 4: Government take in PSCs during the early years of Production.

Royalty	Deep Waters	Shallow Waters
Based on both Price & Volume (%)	29	37
Based on Production Volume (%)	26	35
Based on Oil Price (%)	19	21

Table 5: Government take in JVs under the Proposed Fiscal Terms.

Royalty	Shallow Waters	Onshore (%)
Based on both Price & Volume (%)	88	88
Based on Production Volume (%)	88	88
Based on Oil Price (%)	86	86

Table 6: Comparing Government Take in both PSCs and Jvs.

	Royalty % (current)	Royalty % (proposed)
PSC's (first five years of production)*	18	37
PSCs (After first five years)**	73	73
JV's	89	88

*At 80% cost recovery limit
**Assumed cost oil average of 20 %.

Conclusion:

From the foregoing, the following conclusions can be reached:
1. Sliding royalties based on both oil price and volume of production yield higher government take than those based on either volume of production or price of oil alone.
2. The JVs yield higher government take than PSCs under both current fiscal terms and the proposed fiscal regimes that utilize sliding royalty scale.
3. Government take increases with increasing equity holding under JVs regardless of the tax rate but decreases with increasing expenses in JVs and with increasing cost oil percentage in PSCs.

Nomenclature:

a	Tax rate
CEXP	Company's Expenses
CS	Company's Equity Share
CR	Cost Recovery
EXP	Expenses
GEXP	Government Expenses
GR	Gross Revenue
GS	Government Share
GT	Government Take
NR	Net Revenue
PIB	Petroleum Industry Bill

PO	Profit Oil
Pr	Production
R	Royalty (Bbl)
Rv	Royalty rate based on value (price)
Rpv	Royalty rate based on volume of production
s	Government Profit oil Share
T	Taxation
y	Government Equity Share
z	Cost Recovery Limit

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