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RAT RACE – THE NEW STATE OF GHANA'S PETROLEUM FISCAL ENVIRONMENT AND IMPLICATIONS FOR INDUSTRY COMPETITIVENESS



ACEP
Africa
Centre for
Energy Policy



Executive Summary

Since the discovery of the Jubilee field in Ghana in 2007, more than thirty (30) petroleum agreements (PAs) have been ratified by Parliament. According to the Petroleum Commission, twenty-four (24) discoveries have been made offshore the Western Basin, out of which two have been declared commercially viable while others are at the appraisal stage¹. Ghana's fast-developing oil and gas sector presents a broader development financing opportunity which, when properly harnessed, could transform the country's economy and improve the lives of its people.

As a new comer to the oil and gas business, Ghana leverages on the capital, experience and technology of international oil companies (IOCs) to explore and develop the resource. Fiscal terms of PAs thus govern the relationship between the government and private companies, and determines how benefits and risks will be shared. Striking the balance between the twin goals of investment attraction and revenue maximization, which are not achievable without tradeoffs, is a major challenge to the government. There are evidences to suggest that petroleum fiscal agreements in Ghana have improved over time after the Jubilee discovery. For example royalty has increased from 5% to between 10% and 12.5% for most new PAs. However, it is even more important to ascertain the extent to which improved fiscal terms serve the interests of both the state and the investor such that Ghana is not disadvantaged.

It is against this backdrop that the Africa Centre for Energy Policy (ACEP), in collaboration with Oxfam, has benchmarked the fiscal provisions of four new PAs against Jubilee's to ascertain the

¹ See <http://www.petrocom.gov.gh/discoveries.html>

extent to which new PAs are progressive. The progressivity of new fiscal agreements do not only give a sense of fairness of fiscal provisions that achieve stability. The leniency or toughness of fiscal provisions give a sense of the competitiveness of the oil and gas sector in Ghana.

The approach to the benchmarking study was purely quantitative. Fiscal provisions of the selected PAs were modelled based on a number of assumptions, including production profile and crude prices. Graphs were then generated and interpreted to arrive at findings. The following are the key findings of the study:

1. Ghana's fiscal environment after discovery of oil in Jubilee and the commencement of commercial oil production has improved for the government because all the new PAs analysed showed an improvement in the Government Fiscal Take on both discounted and undiscounted terms.
2. All new PAs analysed show a variability in government take depending on two factors that reflect the differential levels of risks. The first being the depth of the blocks (deep water versus shallow water), and the second being the timing of the approval of the PAs.
3. The structure of Ghana's current fiscal regime – the modern concession regime (hybrid of royalty-tax based and production sharing regimes) provides a better option for Ghana to capture more rent in real terms from its upstream petroleum sector. This is because of the early revenues it offers to the government.
4. The fiscal terms in Ghana's new PAs have remained regressive, which has therefore introduced discretion in the negotiation of PAs and undermines efforts at capturing more rent for the government during boom periods.
5. For the investor, the competitiveness of the environment for upstream investments generally declined after Jubilee on account of reduced rates of project and investor profitability under the PAs. In spite of the declining rates of profitability, the PAs still show long-term viability of projects.
6. The financing structure for investment projects which relies more on debts than equity is more

favourable to the investor. This is because payments on debts (interest) are tax deductible unlike payments on equity (dividends), thereby providing tax savings which improves on investors' returns.

In view of these findings, the following policy recommendations have been made to ensure that the government of Ghana captures enough revenues to compensate for the value of its depleting oil resources:

1. Maintain the structure of the fiscal regime

The government should maintain its modern concession system as it allows for revenue maximization due to its unique features of capturing early revenues from non-cost based fiscal terms such as royalties and profit tax. However, it is important to balance the revenue maximizing objective with investment promotion. Considering that non-cost based terms are regressive to investors, there is the need to determine the optimal level of royalty or other upfront payments such as bonuses to incentivise investments. This also affects the neutrality features of fiscal regimes that ensures that there is neither over-investments nor under-investments.

2. Introduce flexibility into the fiscal regime

Flexibility allows government to capture the benefits of changes in future market and political conditions without changing the fiscal regime. Flexibility can be achieved by the introduction of progressive elements in the fiscal regime such as resource rent taxes. The advantage of resource rent tax is that it captures a share of the natural resource rent, which is the return over and above the company's opportunity cost of capital. The current provision on a dditional oil entitlement is regressive between the Petroleum Agreements due to challenges associated with the choice of the hurdle rate or threshold, the tax rate and the rate of return bands that trigger the AOE. This must be reviewed and properly designed with the support of the appropriate modelling techniques to prevent the temptation of changing the rates when

crude prices increase over sustained periods, and thereby undermining the objective of the resource rent tax as an instrument for fiscal flexibility.

3. Introduce debt financing restrictions

To ensure that investment financing is not adversely affected, debt financing should be allowed with some restrictions on the proportion of debts an investor can use. Thin capitalization rules have been introduced in some jurisdictions including Ghana to restrict debt financing of projects. The new Income Tax Act 2015 (Act 896) introduces thin capitalization in the upstream petroleum industry by allowing tax deductibility on interest at a debt-equity ratio of 3:1, an increase from the ratio of 2:1 provided in the old Internal Revenue Act 2000 (Act 592). This promotes debt financing, a disadvantage to the government of Ghana, as that could provide more tax savings to investors, reducing the tax base and revenues to the government. However, in order not to reduce investment financing in the often very risky oil industry, government must temper the thin capitalization ratio approach with the arms-length approach (or the stand-alone approach where inter-group borrowing is involved) that evaluates the borrowing capacity of a company assuming it borrowed from a third party. Any debt above the debt calculated under the arms-length basis (or the stand-alone approach) should not be tax deductible and any interest in excess of the arm's length (or the stand-alone approach) interest should also not be tax deductible.

4. Build the modelling capacity of institutions

Government must recognize that fiscal negotiations must avoid discretion that is not informed by evidence of its impact on revenue or investments. For a frontier country, Ghana must adopt fiscal terms which are predictable and which do not give room to potential deviations from the objective of the government. To do this effectively, every fiscal decision ranging from the design of the fiscal regime through to fiscal negotiations in PAs must be properly evaluated through the use of purpose-built models. The capacity of state institutions such as the Ministry of Petroleum, the Petroleum Commission, the Ghana Revenue Authority and

Parliament must be built to enhance their modelling competencies and negotiation skills.

Fiscal terms are only a fraction of the entire petroleum agreement. To ensure that fiscal provisions lead to true development, it is imperative that the government of Ghana pays equal attention to other key terms such as relating to local content development, environmental protection, community rights protection, rights to information and conflict resolution processes that have indirect bearing on government's take.

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INTRODUCTION

1.1 Background

Petroleum resources provide resource rich countries with an opportunity to lift their citizens out of poverty and contribute to sustainable development. It is therefore in the interest of petroleum-rich countries to use their resources to obtain revenues for social and economic development. To do so, governments have the option to explore, develop and produce their natural resources directly through their National Oil Companies (NOCs) or enter into different arrangements with foreign companies i.e. International Oil Companies (IOCs) for the purpose of exploiting the resources². Conversely, the extractive industry is capital intensive, risky, and requires the deployment of state of the art technology, skills and expertise. All of these are lacking in most developing resource rich countries. Developing resource rich countries lack the adequate financing requirement and

the capacity to exploit their natural resources successfully. This phenomenon is also compounded by a scarcity of capital, with an interest rate higher than the global rate, and limited access to international capital markets, possibly as a result of their low credit rating³ mainly due to high and unsustainable debt profiles.

The most likely option left for governments is to enter into arrangements with IOCs to leverage their capital and technology for the exploitation of the resources⁴. With respect to the involvement of IOCs, negotiating or entering into the right arrangement is vital to a government's efforts at reaping the benefits of its natural resources. However, the interests of the Government and IOCs are unparalleled although they can be reasonably balanced for their mutual benefits. Governments are faced with the trade-off of

² Radon, J. (2005). The ABCs of Petroleum Contracts: License-Concession Agreements, Joint Ventures, and Production-Sharing Agreements. *Covering Oil: A reporter's Guide to Energy and Development*. Open Society Initiative, New York. <http://archive.Revenuewatch.Org/reports/072305.Shtml>.

³ Available at http://www.eisourcebook.org/688_8RevenueManagementandDistribution.html

⁴ Tordo, S. (2007) Fiscal Systems for Hydrocarbons - Design Issues, WORLD BANK Working Paper No. 123, World Bank, Washington D.C.

attracting investors (given the fact that they are in competition with other natural resource-rich countries) or maximizing revenues. At the same time, investors are looking for destinations that ensure a minimum return on investment where investment risks are minimal or can be shared with other investors or government as well as a stable tax regime. The challenge is therefore to

design a fiscal regime that balances the needs of both parties, and in doing so cut a way through the complications associated with petroleum taxation given the structure and dynamics of the petroleum extraction industry⁵. Ghana is a new petro state that is equally faced with such difficult challenges.

1.2 History of oil and gas development in Ghana

The history of oil exploration in Ghana can be traced back to 1896 when five (5) wells were drilled by West African Oil and Fuel. Between the period of 1909 and 1925, eight (8) wells were also drilled by 'Societe Francaise de Petrole' and 'African and Eastern Trade Corporation. These efforts did not lead to any major discovery.

Major and sustained exploration activities started with the formation of the Ghana National Petroleum Corporation (GNPC) in 1985 under

PNDC Law 64 of 1983. Also, the Petroleum (Exploration and Production) Law, 1984 (PNDC Law 84), and the Petroleum Income Tax Law 1987 (PNDC Law 188) were made to regulate the search for and exploitation of petroleum, resources.

Since its establishment, the GNPC expanded its operations to non-core activities such as tourism and telecommunications. In 2001, the government redirected the efforts of the

²Nakhle, C. (2010). 4 Petroleum fiscal regimes. *The Taxation of Petroleum and Minerals*, 89

company, to focus on investment attraction and promotion of geological data to attract advanced technologies and the required capital for deep-sea exploration.

Between 2001 and 2007, exploration for commercial hydrocarbons intensified as international oil companies such as Kosmos Energy, Hess Corporation and Tullow Oil, began to acquire exploration and production rights over areas in deep water. In 2007, GNPC together with partners, Tullow Oil and Kosmos Energy, announced a significant discovery of light crude

oil offshore, which has become known as “the Jubilee Field”. The Jubilee field began producing in December 2010.

In line with best practices for the governance of petroleum resources, the government established the Petroleum Commission in 2011 under the Petroleum Commission Act 2011 (Act 821) with the mandate to regulate the petroleum activities in Ghana. Numerous discoveries have been made after the Jubilee discovery as presented in table 1 below.

Table 1: Post Jubilee Discovery (2007-2014)

Block	Operator	Discoveries	Discovery Date	Hydrocarbon Type	Status
Shallow Tano	Interoil	Ebony	November 2008	Gas/ Condensate	Marginal/Relinquished
Deepwater	Tullow Oil	Tweneboa-1	March 2009	Gas condensate	Development
		Tweneboa-2	January 2010	Oil	Development
		Owo/ Enyenra-1	September 2010	Oil	Development
		Ntomme	January 2012	Oil and Gas	Development
		Wawa	2012	Oil and Gas	Appraisal

Block	Operator	Discoveries	Discovery Date	Hydrocarbon Type	Status
West Cape Three Points	Kosmos Energy	Odum-1	February 2008	Heavy Oil	Relinquished
		Teak-1	February 2008	Oil and Gas	Appraisal
		Teak-2	March 2011	Gas	Appraised
		Banda-1	June 2011	Oil	Relinquished
		Mahogany Deep	January 2009	Light Oil	Appraised
		Akasa-1	August 2011	Gas	Appraised
Offshore Cape Three Points	ENI	Sankofa-1	September 2009	Gas	Development
		Gye Nyame-1	July 2011	Gas	Development
		Sankofa East	December 2012	Oil and Condansate	Appraisal

Block	Operator	Discoveries	Discovery Date	Hydrocarbon Type	Status
Deepwater Tano Cape Three Points	Hess	Paradise-1	July 2011	Oil and Condensate	Appraisal
		Hickory North-1	May 2012	Oil and Condensate	Appraisal
		Almond-1	September 2012	Oil and Condensate	Appraisal
		Beech-1	August 2012	Oil	Appraisal
		Cob-1	January 2013	Oil	Appraisal
		PN-1	February 2013	Oil	Appraisal
Deepwater Cape Three Points	Lukoil	Dzata-1	February 2010	Oil and Gas	Relinquished
		Lynx-1X	July 2014	Oil and Gas	Relinquished

Source: Petroleum Commission, (2016)

1.3 Ghana's fiscal situation and the role of oil revenues

Ghana has been running a fiscally imbalanced economy for the past years. For instance fiscal deficit as percentage of GDP (excluding grants) increased from 10% in 2009 to 13.1% in 2014. This declined to 6.3% in 2015⁷ mainly due to the IMF's fiscal consolidation program, which the country

⁷International Monetary Fund, IMF (2016), "Time for a Policy Reset", Regional Economic Outlook: Sub-Saharan Africa, April 2016.

is committed to till 2017. That notwithstanding, the country's debt to GDP ratio increased from 69% in 2014 to 73.3% in 2015(ibid), indicating that the government has been borrowing a lot to close up the fiscal deficit.

should narrow the fiscal gap, reduce debt, and provide the government with an opportunity to undertake its development activities. However, existing data show that despite that petroleum revenues accruing to the government increased between 2012 and 2014, fiscal deficit increased too.

Ideally, new sources of revenues to government from the Ghana's hydrocarbon resources

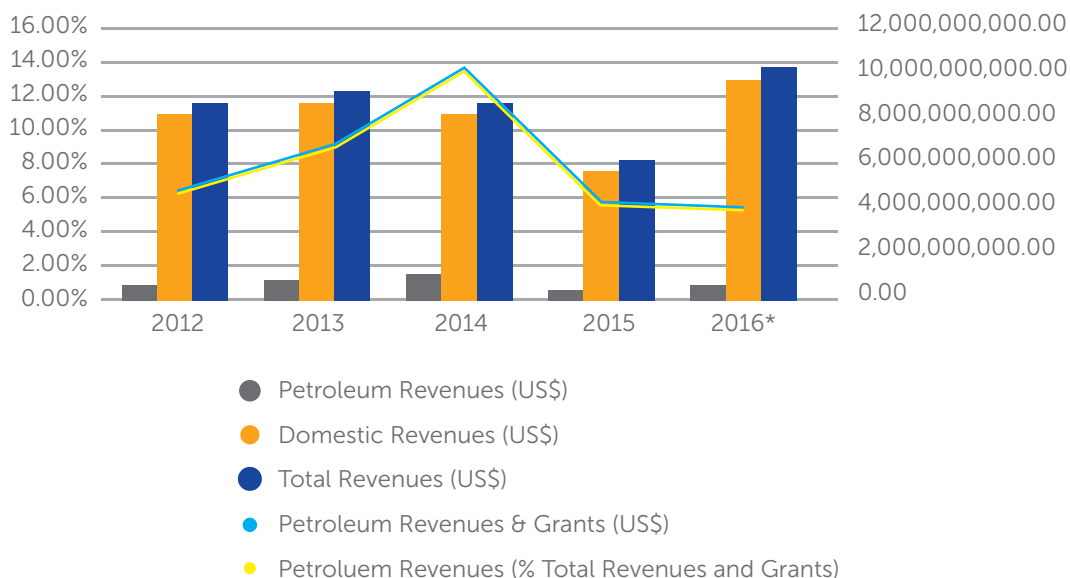


Figure 1: Share of Petroleum Revenues as a Percentage of Government Revenues.

Source: Government Budget and Fiscal Policy Statement (Various) * projected revenues in 2016

According to figure 1, the share of petroleum revenues as a percentage of domestic revenues increased from 6.6% in 2012 to 13.5% in 2014. Similarly, petroleum revenues as a percentage of total revenues and grants increased from 6.2% in 2012 to 13.1% in 2014.

However, as seen from table 2, Ghana's fiscal deficit as percentage of GDP increased from 12.6% in 2012 to 12.9% in 2013. Fiscal deficit was also highest in 2014 when petroleum revenues as

share of domestic revenues was highest among the selected years. The 2014 deficit was largely due to slow disbursement of project grants from development partners and overall weak tax revenue performance arising from lower productivity due to energy crisis, and lower import volumes arising from depreciation of the Cedi. Notwithstanding, tax revenue performance from oil and mineral royalties were relatively stronger⁸.

Table 2: The relationship between Performance of petroleum revenues and fiscal deficit (2012 -2016

Year	Petroleum revenues as percentage of domestic revenues	Fiscal deficit as percentage of GDP (Excluding grants)
2012	6.58%	12.6%
2013	9.50%	12.90%
2014	13.50%	13.1%
2015	5.94%	6.3%
2016*	5.5%	5.3%

Source: IMF 2016 World Economic and Financial Surveys; Government Budget and Fiscal Policy Statement (Various) * projected figures in 2016

⁷International Monetary Fund, IMF (2016), "Time for a Policy Reset", Regional Economic Outlook: Sub-Saharan Africa, April 2016.

The share of petroleum revenues in government revenues later declined in 2015 to 5.9% mainly due to the fall in crude oil prices on the international market. Notwithstanding Ghana's fiscal situation improved in 2015 largely due to implementation of new tax measures⁹. This led to a sharp decline of fiscal deficit to 6.3% from 13.1% from previous year.

It appears that although petroleum revenues

have provided the government with some fiscal space in the budget to finance the much-needed infrastructure which would otherwise be financed with loans and lead to hike in the country's debt to GDP ratio beyond current levels, the inflow of petroleum revenues has led to increased fiscal indiscipline by the government. If petroleum revenues can sustainably support development, it is imperative that fiscal rules be instituted to ensure that revenues are used more judiciously.

1.4 Objectives of the study

Ghana's fiscal rates for upstream petroleum activities (See Figure 2) have improved significantly after the discovery of the jubilee field, reflecting the changing dynamics of the country's geological basin as evidenced in most

frontier countries. For example the average net fiscal contribution from the contracts signed in 2014 in nominal terms is 70% compared to 54% from the Jubilee field. Several factors could account for these dynamics.

⁹ ibid

NPV at crude oil base price of \$55per barrel

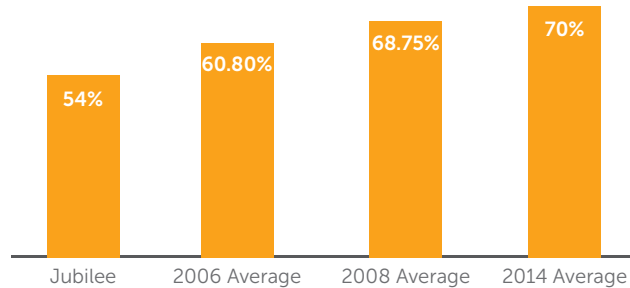


Figure 2: Ghana Oil Contracts-Average net Fiscal contribution

Source: Adam (2016)

Ghana's basin has become more attractive due to the jubilee discovery which has made available new information about the prospects of country's basin. The jubilee discovery and subsequent production of oil and gas also contributed to de-risking the basins, and increased the potential for substantial returns on investments. Also, the increased call for contract transparency by Civil Society Organizations (CSOs) has exerted pressure on Government to negotiate for fair terms.

The sheer increase in fiscal regime does not really say much about its progressivity and

attractiveness (Adam, 2014). Given that revenues from the exploitation of petroleum accrue in later years, one needs to model the regime for the entire contract period to ascertain the fair balance of Government and investors' share of the revenues as well as their responsiveness to changes in price and cost.

This study therefore benchmarks the fiscal terms of four new Petroleum Agreements (PAs) which were ratified before and after oil production in 2010 against the terms in the Jubilee Unit agreement; to analyze the competitiveness of Ghana's fiscal environment for upstream

petroleum investments and establish the extent of progressivity over the years.

Specifically, the study seeks to:

- a. Ascertain whether Ghana's petroleum fiscal environment improved for the state after commercial oil and gas discovery and before commercial production in the Jubilee Fields;
- b. Ascertain whether Ghana's petroleum fiscal environment improved for the state after the commencement of commercial production of oil and gas.

The PAs under consideration in the analysis are:

1. Petroleum Agreement by and among Government of the Republic of Ghana, Ghana National Petroleum Corporation (GNPC), Aker ASA and Chemu Power in respect of South (Deep) Tano (ratified 5th November 2008)
2. Petroleum Agreement by and among Government of the Republic of Ghana, Ghana National Petroleum Corporation (GNPC), GNPC Exploration Company

Limited, CAMAC Energy Ghana Limited (CAMAC ENERGY) and Base Energy Ghana Limited in respect of Shallow Water Tanor Block Offshore, of the Republic of Ghana (ratified in March, 2014).

3. Petroleum Agreement by and among Government of the Republic of Ghana, Ghana National Petroleum Corporation (GNPC), and Sahara Energy Fields Ghana Limited in respect of Shallow Water Cape Three Points Block Offshore the Republic of Ghana (ratified July, 2014).
4. Petroleum Agreement by and among Government of the Republic of Ghana, Ghana National Petroleum Corporation (GNPC), GNPC Exploration and Production Company Limited, UB Resources Limited, Royal Gate Ghana Limited and Houston Drilling Management Ghana Limited in respect of Offshore Cape Three Points South Block (ratified July, 2014).

These PAs are hereafter referred to as Aker, Camac, Sahara and UB Resources respectively.

METHODOLOGY

2.1 Fiscal modelling tool and the fiscal benchmarking approach

A quantitative approach was adopted in this fiscal benchmarking exercise. An excel model was developed to evaluate the impact of the fiscal terms on investment returns and government take. The following summarizes the fiscal benchmarking process:

- i. Input variables include the fiscal terms of the Jubilee Unit Agreement and four new PAs (stated above)
- ii. Petroleum costs, both capital and operational, were based on estimated cost of the Jubilee Field project as input cost
- iii. Baseline analysis was conducted comparing the revenue and investment impact of the fiscal terms of the new PAs against those of the Jubilee Unit Agreement
- iv. Sensitivity analyses were also done to determine the revenue and investment impact of changes in crude oil price.
- v. Modelling output were compared with empirical evidence to further explain patterns of profitability levels to investors and take to the government of Ghana.

2.2 Approach to the selection of petroleum agreements

The Jubilee agreement was selected by default because it serves as the benchmark for comparison of the new Petroleum Agreements¹⁰.

The new Petroleum Agreements were primarily selected based on availability of the Agreements . Petroleum Agreements that were ratified before

¹⁰ The Jubilee Unit Agreement is publicly available. However, the new Agreements were sourced from parliamentary contacts. Thus, if more Petroleum Agreements are publicly available, there can be improved access to information for the purpose of analysis such as this.

and after Jubilee’s 2010 production were then selected. The table below summarizes some key characteristics of the selected petroleum agreements.

Table 3: Characteristics of the petroleum agreements under study

	Jubilee	Aker	Camac	Sahara	UB Group
Date ratified ¹¹	March, 2006	5th November, 2008	27th March, 2014	18th July, 2014	18th July, 2014
Block name	Jubilee Field	South Deep Tano	Expanded Shallow Water Tano	Shallow Water Cape Three Points	Offshore Cape Three Points South Block
Acreage	1080 sq. km	N/A	1500 sq. km	1500 sq. km	755 sq. km

Source: Author’s compilation

Note: N/A means not available

2.3 Data Sources and input variables to the fiscal model

Data that fed into the model, and others that shaped the discussion in this paper, were collected from secondary sources including Petroleum Agreements, Petroleum Laws, websites, and reports by Think Tanks. Other sources include multilateral institutions such as

the World Bank and literature by experts in the extractive sector.

The following Table summarizes the main data on fiscal terms of the Petroleum Agreements which formed the basis of this analysis.

¹¹ Specific day not available for Jubilee contract.

Table 4: Fiscal terms of the 5 petroleum agreements

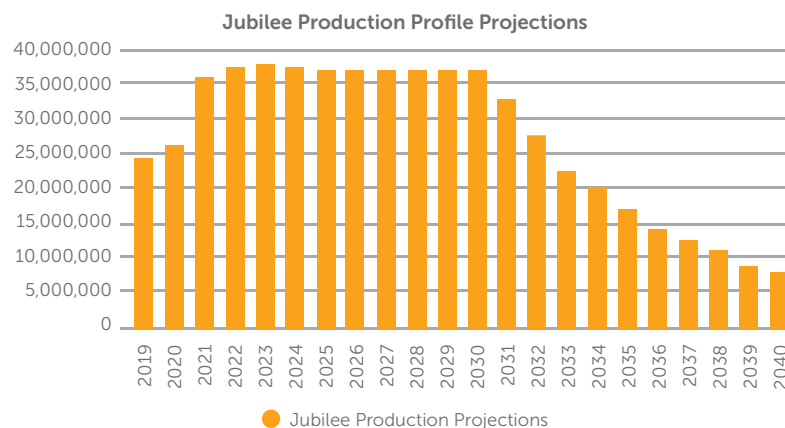
	Jubilee/ 2006	Aker/2008	Camac/2014	Sahara/2014	UB Group/2014
Royalty	5%	10%	12.5%	12.5%	12.5%
Corporate Income Tax	35%	35%	35%	35%	35%
Free Carried Interest	10%	10%	10%	10%	13%
Commercial interest	0%	0%	25%	0%	0%
Additional interest	3.64%	≤15%	≤10%	≤15%	≤25%
Withholding Tax Rates on Dividends	8%	8%	8%	8%	8%
Withholding Tax Rates on Interest	8%	8%	8%	8%	8%
Loss Carry Forward	5 years	5 years	5 years	5 years	5 years
Tax Holiday	0 years	0 years	0 years	0 years	0 years
Import Duty	0%	0%	0%	0%	0%
Capital allowance	100% over five years	100% over five years	100% over five years	100% over five years	100% over five years
Export Tax	0%	0%	0%	0%	0%

Source: Petroleum contracts between and among the Government Ghana, GNPC and contractors;
Ghana's Tax Laws

2.4 Modelling assumptions

1. Project lifespan: 2015 – 2040 (25 years)
2. Production begins: 2019
3. Production level¹²: as presented in figure 3 below

Figure 3: Jubilee production profile projections



Source: Author's computation based on actual Jubilee production between 2011 and 2015, and World Bank (2013) growth rate of petroleum production (2010 – 2030)¹³

4. Real crude oil price per barrel upon production: \$55¹⁴
5. Discount rate¹⁵ : 12%
6. Additional Oil Entitlements (AOEs) do not apply¹⁶

¹⁰ To generate production profiles of the 4 PAs and effectively benchmark against Jubilee, it was assumed that contractors have discovered oil in commercial quantities and that production will begin in 2019 (including Jubilee). Jubilee's actual production from 2011 to 2015 were assumed to be the production levels from 2019 to 2023 in the model. Production levels for subsequent years (2024 -2045) were projected using the growth rate computations ((beginning 2016) based on the World Bank's projections on Jubilee production (2010 – 2030). Growth rate = $\frac{[\text{final}/\text{initial}] - 1}{n} \times 100$.

¹⁴ \$55 per barrel assumption is the 20 year average of Brent crude prices from 1995 to 2015. Raw figures are available at <http://tonto.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&bs=RBRT&bf=A>

¹⁵The average discount rate of the oil and gas sector is 30%. However, 12% was chosen for this modeling exercise because of 1. The assumption that contractors have discovered oil in commercial quantities offshore Ghana and thus exploration risk has been reduced 2. The quality of Tullow's asset portfolio (including Jubilee). See <http://www.iii.co.uk/articles/235778/buy-tullow-oil-after-upgrade>

¹⁶The rationale is to ascertain Government Take under worst case scenario. Further analysis has however been made on applicable AOEs.

ANALYSIS

The discussions in this paper are presented in four parts. The first part examines the long-term viability of projects under the various Petroleum Agreements. The second part discusses the impact of the fiscal regime on investor profitability. The third part presents the impact of the fiscal regimes on the government take. The final part discusses the progressivity of the fiscal regimes in response to changes in crude oil prices. Investment viability and Investor profitability are measured by the Net Present Value (NPV) and the Internal Rate of Return

(IRR), whilst the Government Take is measured by the relative size of revenues the government is entitled to under the various fiscal regimes in the Petroleum Agreements. The Government Take is also presented in both discounted and undiscounted terms to determine the impact of the timing of revenue flows on the project economics since the Petroleum Agreements involve long-term investments projects averaging 25 years. The paper also explored the role of resource rent tax as a tool for capturing more rent for the state.

3.1 Long-term viability of investments under Petroleum Agreements

The long-term viability of investments under the various PAs shows that, relative to the economics of the Jubilee Field project, the new PAs are viable assuming all things being equal. In figure

4, we show that the NPV of the new PAs are lower than that of the Jubilee Benchmark NPV. However, they are still viable since they posted positive NPVs.

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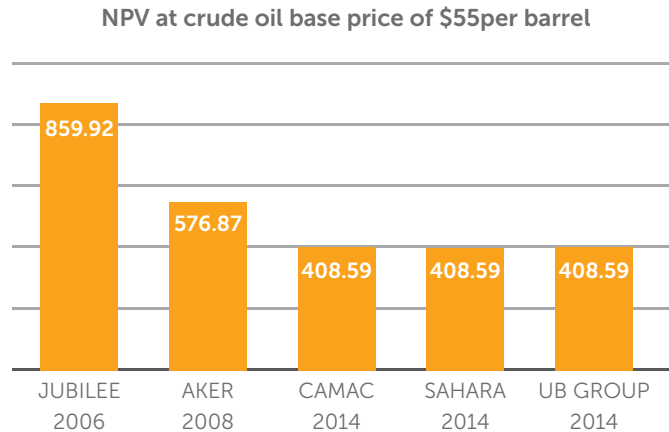


Figure 4: NPV at crude oil base price of \$55 per barrel

Source: Author's computation

Being the first among Ghana's offshore PAs, and given a crude oil price of US\$55 per barrel, the Jubilee project returns the highest NPV of US\$859.92 million. Predictably, the NPVs of the PAs after Jubilee were lower because the discovery of the Jubilee field reduced the uncertainty and risks surrounding upstream investments in Ghana, and thereby strengthened the negotiation position of the government. The trend in the long-term viability of the PAs however show that the later a PA is signed, the lower the level of investment viability. Thus, the

PA with Aker signed in 2008, two years after the Jubilee Unit PA, is more viable than the PAs with Camac Energy, Sahara and UB Resources, which were all signed at the same time in 2014.

The trend in figure 4 is therefore an indication that the jubilee discovery and the commencement of commercial production of oil led to an improvement in the fiscal environment in favor of the government. However, since the investment viability of the PAs reduces, the attractiveness of Ghana's oil industry could be compromised

and could adversely affect upstream investment attraction to the country. This notwithstanding, that the NPV is positive for all projects is clear indication that projects executed under all the PAs are still profitable.

3.2 Impact of Fiscal Regimes on Investor Profitability – Baseline Scenario

A promising petroleum agreement to an investor is one that delivers higher return on investment. Benchmarked to the Jubilee project, the investor IRR reduces depending on the time the PAs were signed and the risks associated with the oil block as determined by the depth of the area (deep or shallow waters). For instance, from Figure 5, the investor IRR of the PAs with Sahara and UB Resources signed in 2014 are marginally lower than that of Jubilee and Aker signed in 2006 and 2008 respectively.

However, in spite of the fact that the PA with

Camac was signed the same year as that of UB Resources, the investor IRR of the former is marginally higher than that of the latter. This is because whereas the Camac block is located in shallow waters and posts relatively lower risks, UB Resources' block is in deep waters. In the case of the Sahara block, although it is in shallow waters, it returns a relatively lower investor IRR than Camac's, another shallow water block, because the government is entitled to an additional interest of up to 15% in the Sahara PA compared to 10% in the Camac PA which reduces the gains to the investor in Sahara.

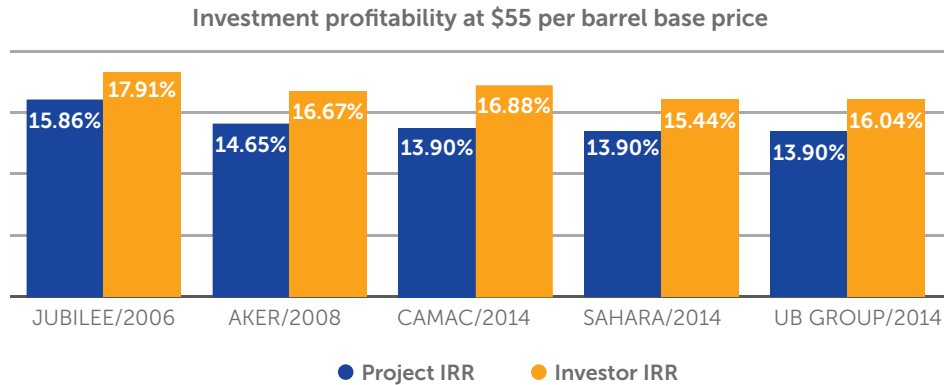


Figure 5: Investment profitability at base price of \$55 per barrel

Source: Author's computation

Another important finding from the modeling results is that the investor IRR (leveraged) for each of the projects under the PAs is higher than their counterpart project IRR. The project IRR is based on cash flows to the project without consideration of financing cash flows. The investor IRR on the other hand (also called the Equity IRR) considers cash flows net of financing and therefore represents the rate of a return of a project to the investor for equity financing. If the project is fully funded by equity, the investor IRR will be equal to the project IRR. Given that

the projects under the PAs are assumed to be financed by a mix of debt and equity, the Investor IRR will be higher than the project IRR since debt financing improves investor IRR, whereas it does not affect project IRR. This is because, payment to debts (interests) is tax deductible and therefore provide a tax shield to the investor whose payments (dividends) improves due to tax saving. For investments to be profitable therefore, the investor IRR must be higher than the project IRR. Oil companies mix debt financing with equity to achieve greater profitability and especially so

in jurisdictions where there are poor or no debt financing restrictions (thin capitalization rules).

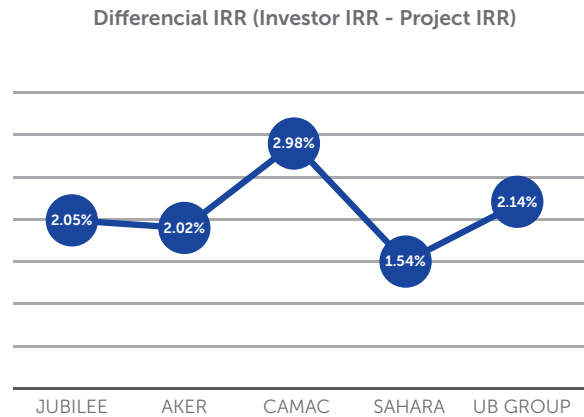


Figure 6: Differential IRR showing the level of profitability of projects to investors

Source: Author's computation

From Figure 6, we show that although all PAs provide higher investor IRR than project IRR indicating that the projects under all the PAs are profitable, the degree of profitability differs from one PA to another. For instance, the Camac PA will be the most profitable investment to the investor whilst the Sahara PA is the least profitable.

This implies that the investors will find the PAs favorable if they finance the projects by a mix of equity and debt; which ensures that returns on equity is higher than returns on the project.

The above analyses show that the fiscal environment has generally improved for the investor depending on the financing structure

of their projects after the commencement of commercial production of oil compared to the period immediately following discovery of oil in the Jubilee Fields.

3.3. Impact of Fiscal Regimes on Government Take – Baseline Scenario

The modeling results also show that the fiscal terms in the various PAs provide more potential for government to generate revenues to finance development. The most significant finding in this respect is the considerably higher differences between the discounted and undiscounted government-take.

Ghana's fiscal regime has cost and non-cost based fiscal terms. For instance, royalty is a non-cost based payment whilst participating interest is cost-based. Similarly, the regime allows for early revenue to the government although a significant amount of the project cost may not be recovered. For example, whilst early revenue from royalties is guaranteed with production, corporate taxes are feasible on account of the capital allowance regime applied in Ghana, under

which the cost of the projects are amortized over 5 years by equal installments. These features of the fiscal regime have greater implications on the size of the discounted and undiscounted government takes. The theory of time value of money provides that the earlier a cash flow occurs, the more valuable it is and the higher is the NPV than cash flow occurring in future¹⁷. Thus, depending on the timing of receipt of revenue by the government, the improvement on the fiscal environment can be assessed in terms of the present value of the revenue.

The fiscal terms in all the PAs under consideration all show that the government take in discounted terms increased since the Jubilee Unit PA ranging from 76% in Aker's PA to 83% in Sahara's (See Figure 7). Therefore on average,

¹⁷ See appendix 5 for further analysis.

the government-take increases from 66.65% in the Jubilee Unit PA to 76.67% in the PA with Aker to 81.45% in the three other PAs (Camac, Sahara and UB Resources) signed after commencement of commercial oil production. This shows that

in respect of the government take, there has been a substantial improvement in the fiscal environment in favor of the government after the jubilee discovery and the commencement of commercial oil production.

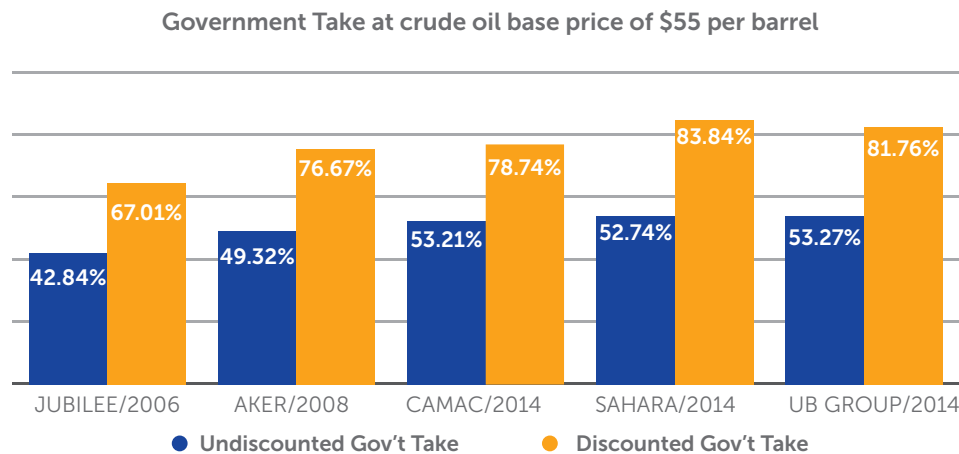


Figure 7: Government Take at crude oil base price of \$55 per barrel

Source: Author's computation

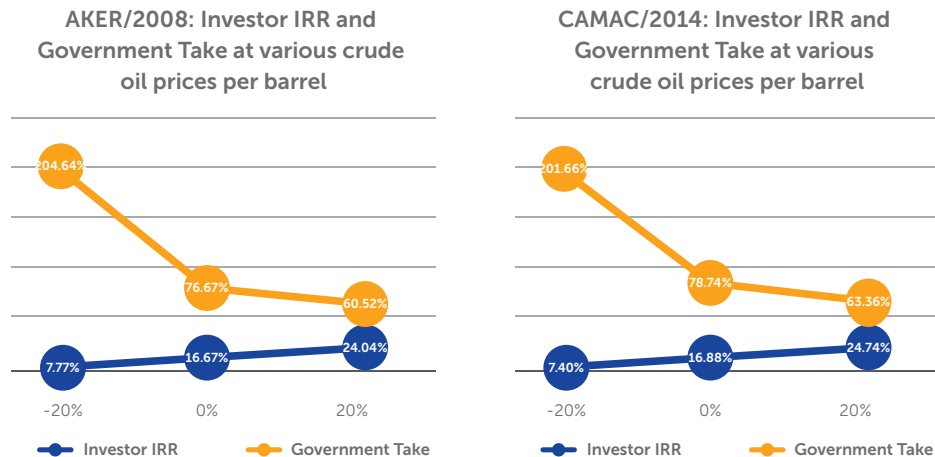
The policy implication of this finding is that, Ghana's fiscal regime – the modern concession regime (hybrid of royalty-tax based and production sharing regimes) provides a better option for Ghana to capture more rent in real

terms from its upstream petroleum sector as it allows for fiscal terms that guarantee early revenues for the government.

3.4 Progressivity of Fiscal Regimes

The sensitivity tests to determine the progressivity of Ghana's fiscal regime show that for most parts, the regime is regressive. This conclusion is discussed under a crude oil price scenario. The theory of government-take suggests that there should be positive relationship between crude oil prices and government-take assuming production is constant, fiscal terms are constant and there are no provisions for additional oil

entitlement. The modelling results in Figure 8 however show the reverse. When crude oil price increases from the base by 20%, investor IRR (leveraged) increases but the government-take (discounted) decreases for all the PAs under consideration (a decline by 16.15% in Aker; 15.38% in Camac; 18.57% in Sahara and 17.02% in UB Resources).



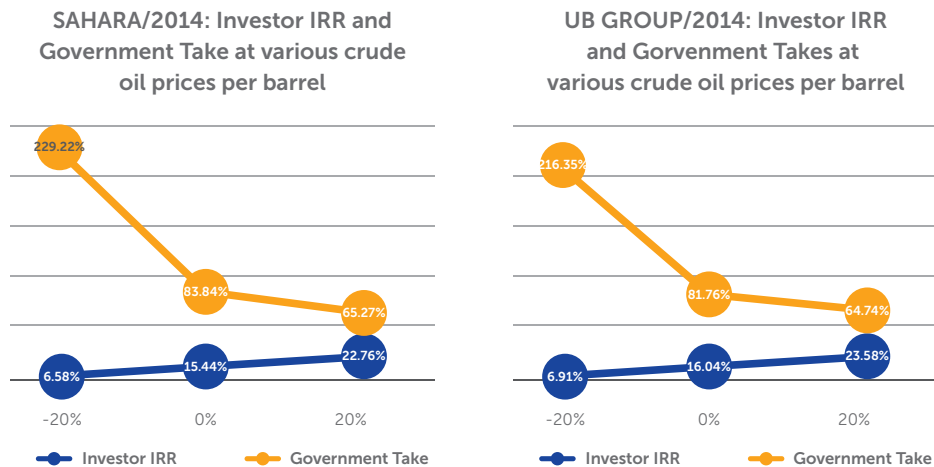


Figure 8: Investor IRR and Government Take at various crude oil prices per barrel

Source: Author's computation

In comparison with Jubilee, the PAs after Jubilee are relatively more regressive. Therefore, in terms of the progressivity of the fiscal regime, there is no improvement in the fiscal environment after discovery and commencement of commercial production of oil. This shows that the design of fiscal regimes and the negotiation of the fiscal

terms in the PAs are not often informed by any sound modelling or evaluation. This introduces discretion in the negotiation of PAs, lack of fiscal stability and undermines efforts at capturing more rent for the government during boom periods.

3.5 Improving the progressivity of the Government Fiscal Take – the role of Resource-rent tax

The model demonstrates worst case scenario for the government of Ghana where fiscal terms are not flexible enough to capture excess profit in times of price hikes or cost falls through resource-rent taxation. The modeling results show that at base price, government-take improves for all PAs compared to Jubilee. The implication therefore is that should resource-

rent tax apply, government take is likely to be better than values achieved at base price. It is commendable therefore that all PAs feature provisions for additional oil entitlements to capture more revenues when company cash flows exceed established limits. These are presented in table 5 below.

Table 5: Additional Oil Entitlement of the new PAs

Rate of Return Thresholds	Aker/2008	Camac/2014	Sahara/2014	UB Group/2014
<12.5%	0.0%	0.0%	0%	0.0%
12.5%		12.5%	8%	10.0%
14.0%	10.0%			
15.0%				
17.5%	12.5%	15.0%	12%	12.5%
18.0%				
19.0%				
20.0%				
22.5%	20.0%	17.5%	15%	20.0%
23.0%				
25.0%				

Rate of Return Thresholds	Aker/2008	Camac/2014	Sahara/2014	UB Group/2014
27.5%	30.0%	22.5%	22%	25.0%
28.0%				
30.0%				
32.0%				
32.5%		30.0%	30%	30.0%
33.0%				
35.0%				
37.5%				
38.0%				
40.0%				

Source: Various Petroleum Agreements

As seen from table 5 above, the lower and upper limits of AOE have improved for the 2014 agreements compared to the 2008 agreement. AOE begins to apply when the investors' rate of Return (ROR) reach 12.5% compared to initial 14% under the Aker agreement. The maximum threshold has also shifted from 27.5% ROR to 32.5% ROR.

Table 6 below shows that AOE rates apply to all PAs because the investor rate of return (ROR) on all post Jubilee PAs exceed the minimum threshold of $\leq 12.5\%$ at base price, as well as when price rises and/or costs fall. It further shows that government will receive the most windfall revenues when prices rise than when costs fall. 7.82, 7.27, 7.5

Table 6: Applicable AOE rates on profit at various IRRs

	Aker/2008	Camac/2014	Sahara/2014	UB Group/2014
IRR @ base price	16.67%	16.88%	15.44%	16.04%
Applicable AOE rate on profit @ base price	10%	12.5%	8%	10%
IRR @ 20% rise in crude price	24.04%	24.74%	22.76%	23.58%
Applicable AOE rate on profit @ 20% rise in crude price	20%	17.5%	15%	20%
IRR @ 20% fall in operating cost	19.57%	20.26%	18.59%	19.28%
Applicable AOE rate on profit @ 20% fall in operating cost	12.5%	15%	12%	12.5%
IRR @ 20% fall in capital cost	22.01%	22.52%	20.69%	21.44%
Applicable AOE rate on profit @ 20% fall in capital cost	12.5%	17.5%	12%	12.5%

Source: Author's compilation based on modelling results and various petroleum agreements

The problem with the current AOE provisions is that it is regressive between the PAs. For instance with a 20% increase in crude oil price at an AOE rate of 12.5%, investor profitability increases by 8 percentage points from the base of 16.94% for the Camac PA. Meanwhile, investor profitability increases at same percentage point from base for the UB Resources PA. Yet, a lower AOE rate of 10% applies. The objective of the AOE in incentivizing investments therefore discriminates between the PAs and results in undermining the consistency and predictability of the fiscal terms.

KEY FINDINGS, CONCLUSION, AND RECOMMENDATION

4.1 Findings and Conclusions

The objectives of the study was to ascertain the extent to which Ghana's fiscal environment has improved after oil and gas discovery and the commencement of commercial oil production. The study shows that there has been substantial improvement in the fiscal environment indicated by higher government fiscal take in all the new PAs surveyed. However, the competitiveness of the oil industry declined as profitability indicators show marginal decrease for investors. Government has therefore focused more on the objective of maximizing revenue at the expense of investment attraction. The fiscal regime has however become more regressive than it was in the Jubilee Unit PA indicating significant levels of discretion in the design of the regime and during negotiations.

The specific findings are presented as follows:

4.1.1 For the Government

- i. The fiscal environment after discovery of oil in Jubilee and the commencement of commercial oil production improved. All the new PAs analysed showed an improvement in the Government Fiscal Take on both discounted and undiscounted terms.
- ii. The structure of Ghana's current fiscal regime – the modern concession regime (hybrid of royalty-tax based and production sharing regimes) provides a better option for Ghana to capture more rent in real terms from its upstream petroleum sector as it allows for fiscal terms that guarantee early revenues for the government consistent with the time value of money. This is further explained by the higher discounted government-take of the PAs relative to the undiscounted take.
- iii. All new PAs analysed show a variability in

government take depending on two factors that reflect the differential levels of risks. The first being the depth of the blocks (deep water versus shallow water), and the second being the timing of the approval of the PAs.

- iv. The fiscal terms in Ghana's new PAs have remained regressive, which has therefore introduced discretion in the negotiation of PAs and undermines efforts at capturing more rent for the government during boom periods.

4.1.2 For the Investor

- i. The competitiveness of the environment for upstream investments generally declined after Jubilee on account of reduced rates of

project and investor profitability under the PAs. However, the PAs still show long-term viability of projects as demonstrated by their positive NPVs.

- ii. A project financing structure under the PAs that mixes equity and debt will improve on investor profitability where the cost of equity is greater than the cost of debt. Investors are better off where their investments are financed with debts as payments for debts (interest) are tax deductible unlike payments to equity (dividends), thereby providing tax savings which improves on returns on investor's equity. This is indicated by the higher levels of investor IRR under each of the PAs relative to the project IRR.

4.2 Recommendations

1. **Maintain the structure of the fiscal regime**

The government should maintain its modern concession system as it allows for revenue maximization due to its unique features of capturing early revenues from non-cost based fiscal terms such as royalties and profit tax. However, it is important to

balance the revenue maximizing objective with investment promotion. Considering that non-cost based terms are regressive to investors, there is the need to determine the optimal level of royalty or other upfront payments such as bonuses to incentivise investments. This also affects the neutrality

features of fiscal regimes that ensures that there is neither over-investments nor under-investments.

2. **Introduce flexibility into the fiscal regime**

Flexibility allows government to capture the benefits of changes in future market and political conditions without changing the fiscal regime. Flexibility can be achieved by the introduction of progressive elements in the fiscal regime such as resource rent taxes. The advantage of resource rent tax is that it captures a share of the natural resource rent, which is the return over and above the company's opportunity cost of capital. The current provision on additional oil entitlement is regressive between the Petroleum Agreements due to challenges associated with the choice of the hurdle rate or threshold, the tax rate and the rate of return bands that trigger the AOE. This must be reviewed and properly designed with the support of the appropriate modelling techniques to prevent the temptation of changing the rates when crude prices increase over sustained periods, and thereby undermining the objective of the resource rent tax as an instrument for fiscal flexibility.

3. **Introduce debt financing restrictions**

To ensure that investment financing is not adversely affected, debt financing should be allowed with some restrictions on the proportion of debts an investor can use. Thin capitalization rules have been introduced in some jurisdictions including Ghana to restrict debt financing of projects. The new Income Tax Act 2015 (Act 896) introduces thin capitalization in the upstream petroleum industry by allowing tax deductibility on interest at a debt-equity ratio of 3:1, an increase from the ratio of 2:1 provided in the old Internal Revenue Act 2000 (Act 592). This promotes debt financing, a disadvantage to the government of Ghana, as that could provide more tax savings to investors, reducing the tax base and revenues to the government. However, in order not to reduce investment financing in the often very risky oil industry, government must temper the thin capitalization ratio approach with the arms-length approach (or the stand-alone approach where inter-group borrowing is involved) that evaluates the borrowing capacity of a company assuming it borrowed from a third party. Any debt above the debt calculated under the arms-length basis (or

the stand-alone approach) should not be tax deductible and any interest in excess of the arm's length (or the stand-alone approach) interest should also not be tax deductible.

4. **Build the modelling capacity of institutions**

Government must recognize that fiscal negotiations must avoid discretion that is not informed by evidence of its impact on revenue or investments. For a frontier country, Ghana must adopt fiscal terms which are predictable and which do not give room to potential deviations from the objective of the government. To do this effectively, every fiscal decision ranging from the design of the fiscal regime through to fiscal negotiations in PAs must be properly evaluated through the use of purpose-built models. The capacity of state institutions such as the Ministry of Petroleum, the Petroleum Commission, the Ghana Revenue Authority and Parliament must be built to enhance their modelling competencies and negotiation skills.

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APPENDICES

Appendix 1: Jubilee production profile projections

Year	World Bank Production Projections(MBb)	Growth Rate	Jubilee Production Projections ¹⁸
2018	36	-	
2019	67	86%	24,195,895
2020	72	7%	26,351,278
2021	106	47%	35,587,558
2022	114	8%	37,201,691
2023	114	0	37,411,661
2024	114	0	37,000,000
2025	114	0	37,000,000
2026	114	0	37,000,000
2027	114	0	37,000,000
2028	114	0	37,000,000
2029	114	0	37,000,000
2030	114	0	37,000,000
2031	99	-13%	32190000
2032	85	-14%	27683400
2033	72	-15%	23530890
2034	61	-15%	20001257
2035	52	-15%	17001068
2036	44	-15%	14450908

Year	World Bank Production Projections(MBb)	Growth Rate	Jubilee Production Projections ¹⁸
2037	38	-14%	12427781
2038	32	-16%	10439336
2039	27	-16%	8769042.1
2040	23	-15%	7453685.8
2041	20	-13%	6484706.6
2042	17	-15%	5512000.6
2043	14	-18%	4519840.5
2044	12	-14%	3887062.8
2045	12	0%	3887062.8

Source: World Bank (2013). Energizing Economic Growth in Ghana: Making the Power and Appendix 2: Additional Oil Entitlements (AOE) Petroleum Sectors Rise to the Challenge, Energy Group Africa Region June 2013. Annex 6.3; 2012 annual report on the petroleum funds; 2015 reconciliation report on petroleum holding funds; author's computation.

Rate of Return Thresholds	CAMAC	SAHARA	UB GROUP	Aker ASA
<12.5%	0.0%	0%	0.0%	0.0%
12.5%	12.5%	8%	10.0%	
14.0%				10.0%
15.0%				
17.5%	15.0%	12%	12.5%	12.5%
18.0%				
19.0%				

¹⁸ Production levels between 2019 and 2023 are actual Jubilee production figures (2011 – 2015). Subsequent years were projected using growth rates generated by author based on the World Bank's Jubilee production projections (2010 – 2030).

Rate of Return Thresholds	CAMAC	SAHARA	UB GROUP	Aker ASA
20.0%				
22.5%	17.5%	15%	20.0%	20.0%
23.0%				
25.0%				
27.5%	22.5%	22%	25.0%	30.0%
28.0%				
30.0%				
32.0%				
32.5%	30.0%	30%	30.0%	
33.0%				
35.0%				
37.5%				
38.0%				
40.0%				

Energy Group Africa Region June 2013. Annex 6.3; 2012 annual report on the petroleum funds; 2015 reconciliation report on petroleum holding funds; author's computation.

Source: Various petroleum agreement

Appendix 3: Impact of changes in operating cost on Government Take and Investor IRR

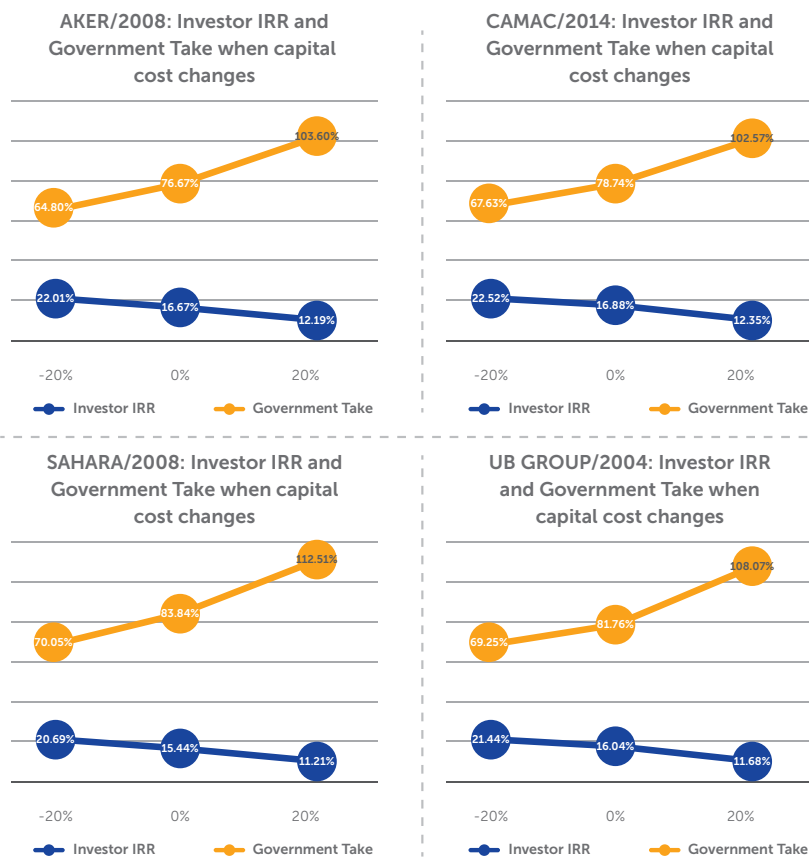
The theory of government take under an operating cost scenario suggests that all other things being equal, government take should increase with increased investor profitability when operating costs fall. We show contrarily in appendix 3 that under the fiscal arrangements of the new PAs, investor IRR increases when operating costs fall but government take (discounted) declines by 8.74% in Aker, 9.51% in Camac, 11.18% in Sahara and 10.61% in UB Resources.



Source: Author's computation

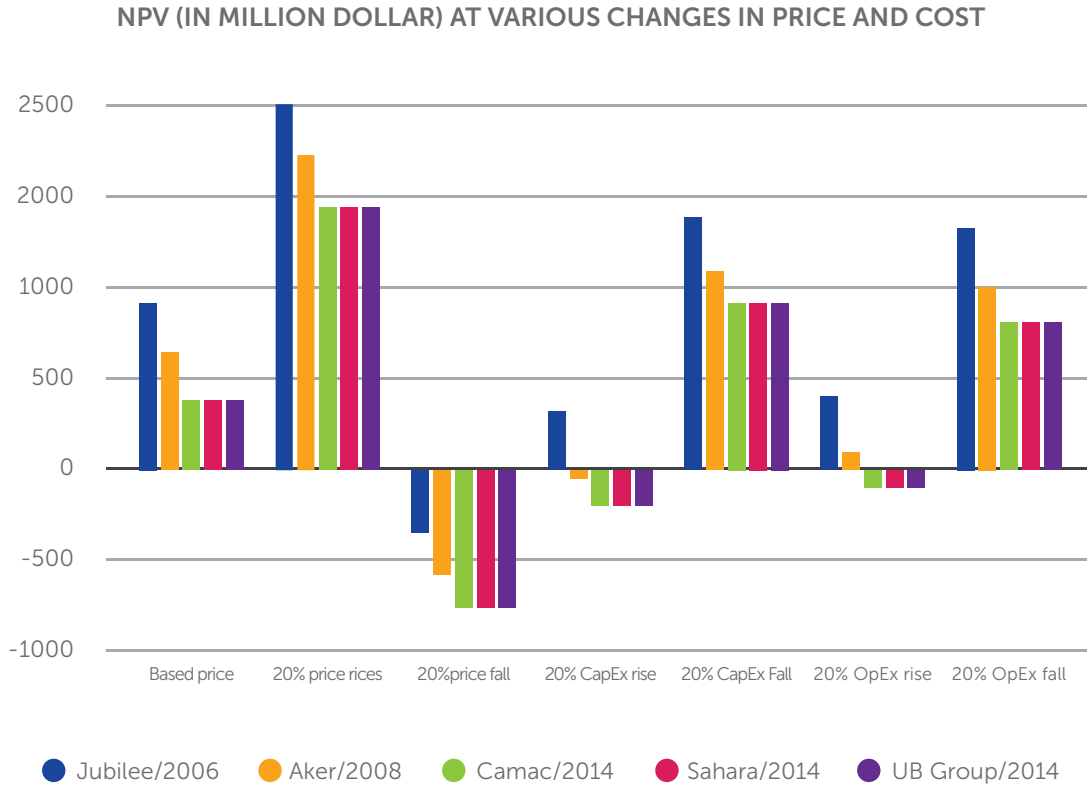
Appendix 4: Impact of capital cost changes on investor IRR and Government Take

The trend of government take when capital costs fall follows a similar pattern as when operating costs fall.



Source: Author's computation

Appendix 5: NPV (\$m) at various changes in price and cost



Source: Author's computation

Introduction

The confusion usually arises when discounted government take is higher than undiscounted government take for certain fiscal regimes such as Ghana's. As a rule of thumb, countries with regressive fiscal regimes normally have higher discounted government take. This is because early cash flows such as royalties, bonuses, surface rent, and others are weightier than late cash flows such as profits-based taxes.

In this section, a simple NPV formula is used to show that the present worth of 5% and 7% royalty collected early on over the lifespan of a resource extraction project will be higher than if collected later. The higher the royalty, the bigger the discounted government take.

Initial assumptions

- a. Royalty: 5% and 7%
- b. Royalty base is the gross resource revenue (average price * production level each year).
- c. Average price: \$1,153
- d. Production begins: 2019
- e. Production level: 200,000toz in 2019
- f. Project lifespan: 30 years (2015 – 2045)
- g. Discount rate: 12%
- h. Discounting year: 2016
- i. Present Value (PV) formula: $c(1+r)^{-n}$, where c is royalty value, r is the discount rate and n is the discounting period.

Calculation

$$\begin{aligned} \text{Gross resource revenue in 2019} &= \$1,153 * 200,000\text{toz} &&= \mathbf{\$230,600,000} \\ \text{5\% royalty on gross resource revenue in 2019} &&&= \mathbf{0.05 * \$230,600,000} \\ &&&= \mathbf{\$11,530,000} \\ \text{PV of \$11,530,000 at 12\% discount rate for 3 years} &&&= \mathbf{\$11,530,000 * (1.12)^{-3}} \\ &&&= \mathbf{\$11,530,000 * (0.7118)} \\ &&&= \mathbf{\$ 8,207,054} \end{aligned}$$

Therefore, the present worth of 5% royalty on gross mineral revenue in 2019 is \$8,207,054

Further assumptions

Assuming that production is constant at 200,000toz over the project's lifespan, the present worth of \$11,530,000 royalty at 12% discount rate for 25 years (from 2041)

$$\begin{aligned} &= \mathbf{\$11,530,000 * (1.12)^{-25}} \\ &= \mathbf{\$11,530,000 * (0.058)} \\ &= \mathbf{\$668,740} \end{aligned}$$

Therefore, the present worth of 5% royalty on gross resource revenue in 2041 is **\$668,740**

Observation

Based on the above analogy, it follows logic that when royalty is higher than 5%, discounted government take is expected to be higher and vice versa. For example: at 7% royalty, discounted government take over the next 3 years and 25 years will be \$11,489,875.6 and \$936,236 respectively, compared to \$ 8,207,054 and \$668,740 respectively at 5% royalty. The earlier the revenue, the higher the government take. This is because the discounting factor $((1+r)^{-n})$ reduces over longer years as seen in the case of 0.058 over 25 years compared to 0.7118 over 3 years.

Source: Author's compilation

Appendix 7: Status of oil and gas discoveries in Ghana

Block	Operator	Discoveries	Discovery Date	Hydrocarbon Type	Status
Shallow Tano	Interoil	Ebony	November 2008	Gas/ Condensate	Marginal/Relinquished
Deepwater	Tullow Oil	Tweneboa-1	March 2009	Gas condensate	Development
		Tweneboa-2	January 2010	Oil	Development
		Owo/ Enyenra-1	September 2010	Oil	Development
		Ntomme	January 2012	Oil and Gas	Development
		Wawa	2012	Oil and Gas	Appraisal

Block	Operator	Discoveries	Discovery Date	Hydrocarbon Type	Status
West Cape Three Points	Kosmos Energy	Odum-1	February 2008	Heavy Oil	Relinquished
		Teak-1	February 2008	Oil and Gas	Appraisal
		Teak-2	March 2011	Gas	Appraised
		Banda-1	June 2011	Oil	Relinquished
		Mahogany Deep	January 2009	Light Oil	Appraised
		Akasa-1	August 2011	Gas	Appraised
Offshore Cape Three Points	ENI	Sankofa-1	September 2009	Gas	Development
		Gye Nyame-1	July 2011	Gas	Development
		Sankofa East	December 2012	Oil and Condansate	Appraisal

Block	Operator	Discoveries	Discovery Date	Hydrocarbon Type	Status
Deepwater Tano Cape Three Points	Hess	Paradise-1	July 2011	Oil and Condensate	Appraisal
		Hickory North-1	May 2012	Oil and Condensate	Appraisal
		Almond-1	September 2012	Oil and Condensate	Appraisal
		Beech-1	August 2012	Oil	Appraisal
		Cob-1	January 2013	Oil	Appraisal
		PN-1	February 2013	Oil	Appraisal
Deepwater Cape Three Points	Lukoil	Dzata-1	February 2010	Oil and Gas	Relinquished
		Lynx-1X	July 2014	Oil and Gas	Relinquished

Source: Petroleum Commission



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