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A POLICY BRIEF ON
**THE POTENTIAL FISCAL CONTRIBUTION
OF THE SHEINI IRON ORE DEPOSITS IN
NORTHERN GHANA**

Executive Summary

In the wake of increasing global economic challenges amidst unprecedented political events that may have significant impact on the world economies, Ghana is again blessed with an iron ore mine which is yet to be developed. The mine has the potential to expand the country's economic progress and have trickling down effects of social progress and sustainable development for its peoples. It therefore becomes imperative to understand the extent of fiscal impacts that Ghana's Sheini iron ore project is likely to bring. It is against this backdrop that the Africa Centre for Energy Policy (ACEP), through its partnership with WACAM under the auspices of OSIWA, undertook this fiscal benchmarking study. The approach to the study was quantitative. Using an excel fiscal model, the Sheini iron ore project was situated within the geological and project context of Guinea's Simandou iron ore project to compare Ghana's mining fiscal policy against the fiscal provisions of the contract between the Government of Guinea and Simfer S.A. The purpose was to determine the level of fiscal convergence between the two projects and use findings as an important guide for improving on the fiscal take from Ghana's Sheini iron ore project.

The following were the key findings about the competitiveness of Ghana's mining fiscal terms and how equitable they are in ensuring that the government and its people benefit from the mining sector:

From Government Perspective

1. Ghana's fiscal environment is better than Guinea's Simandou contract fiscal provisions. The analyses show higher government take in both discounted and undiscounted terms from Ghana's Sheini iron ore project than the Simandou project. The former project therefore makes higher fiscal contribution to the Republic of Ghana than the latter does to the Republic of Guinea.
2. Ghana's current mining fiscal regime – the royalty system – provides an opportunity for the

government to capture more rent in real terms from its mining 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 Sheini iron ore mine relative to the undiscounted take. Guinea's Simandou royalty system also provides similar early revenues to the Guinean government but at a lower rate.

3. The variability in government take between Shieni and Simandou can be explained by the generous fiscal terms that the Guinean government offers to the investors.
4. The fiscal terms of both Ghana's Minerals and Mining Act and that of the Simandou contract remain regressive. When price rises, investor profitability increases but government take declines. Due to absence of resource rent tax, both governments are unable to optimally capture value from the economic rent that investors enjoy during boom period.

From Investor Perspective

1. The competitiveness of the environment for investment in Ghana's mining sector is lower than Guinea on account of its lower project and investor profitability given the circumstances of the Sheini project. However, both the Simandou and Sheini iron ore projects show long term viability as demonstrated by their positive NPVs.
2. Any fiscal provision that purports to relieve the investor of some of his tax burdens will improve his profitability. Higher profitability of the Simandou project is as a result of the generous fiscal terms that the Guinean Government granted to Simfer S.A. (the Simandou partners) to incentivize the investors to develop the mine and the local economy. Ghana also offers some investment incentives such as the expanded leverage in the thin capitalization rule of a debt-equity ratio of 3:1 provided for in the new Income Tax Act 2015 (Act 896). This promotes debt financing, and provides more tax savings to investors.

Infrastructure requirements

1. The infrastructure requirement and cost for the Sheini project is not as huge as that of Guinea. Unlike the Simandou project in Guinea, Ghana already has two functioning harbors in Takoradi and Tema which are about 400 kilometers south of Sheini. However, existing road and railway infrastructure to transport iron ore are inadequate to link Sheini to the harbors in the South.
2. To invest in slurry pipes will be cost effective but only serve the mines. Upon decommissioning, slurry pipes may be redundant, provide little or no socio-economic benefits, and pose environmental challenges to the country. On the other hand, in addition to serving the mines, the railway infrastructure would serve the socio-economic interest of the country during and long after decommissioning of the mine project as it will widen trade interactions between northern and southern Ghana. It can also be income-generating if extended to serve land-locked neighboring countries such as Burkina Faso.

To increase government take from the Sheini iron ore project, the following recommendations are made to the government of Ghana:

1. Introduce an open and competitive bidding process for the award of mining contracts.

To this day, mining concessions are awarded on a first come first serve basis. The process depends on the discretionary powers of authorities and are considered the pathway to rent-seeking and corruption (ACEP, 2016). The process also yields itself to the risk of granting generous terms that may result in sub-optimal outcomes. In the absence of open and competitive bidding process that ensures efficiency and transparency, Ghana risks losing significant revenues from the Sheini iron ore project whose development contract is yet to be awarded. The mining laws should be revised to make the open and competitive bidding process a compulsory procedure to select the best candidate, maximize revenues and minimize the risk of moral hazard among agents of the state.

2. Introduce flexibility into the fiscal regime.

Fiscal terms, through progressive taxes, must be flexible enough to ensure fairness and balance the interest of both the investor and the government. Flexibility allows government to capture the benefits of changes in future market and political conditions without changing the fiscal regime. 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.

3. Build the modelling capacity of government institutions

In the short-to-medium term, 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 mining agreements must be properly evaluated through the use of purpose-built models. The capacity of state institutions such as the Ministry of Mines and Natural Resources, the Ghana Revenue Authority and Parliament must be built to enhance their modelling competencies and negotiation skills.

4. 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 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 mining 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.

5. Invest in Railway Infrastructure

An investment in railway infrastructure that connects Sheini with the harbors in the South fits within Ghana's development plan because it provides long-term opportunity to close the communication gap between local economies in northern and Southern Ghana. Public Private Partnership is an optimal strategy for railway infrastructure development as it will balance Ghana's development plan with the investor's likely preferred option to build and operate a cost-effective slurry pipeline. To incentivize the investor to finance the railway infrastructure, the government of Ghana may make budgetary commitments to this project by complementing investor expenses on transport infrastructure with petroleum revenues allocated to the Annual Budget Funding Amount (ABFA) for capital projects in accordance with the provisions of the Petroleum Revenue Management Act (PRMA).

This report comes in five chapters. The first chapter provides background information to the study. The second chapter details out the methodology employed in this exercise. The third chapter features the analysis and discussions proper. The results of the study have been presented and discussed in the light of market and investment realities arising. The fourth chapter contains an analysis of

infrastructure requirements of the Sheini iron ore project. The last chapter concludes with a summary of key findings and provides key recommendations which, if adopted, will optimize the benefits from the Sheini iron ore project from the government and investor's perspective.

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List of Abbreviations

ABFA	Annual Budget Funding Amount	IFC	International Finance Corporation
ACEP	Africa Centre for Energy Policy	IRR	Internal Rate of Return
CAPEX	Capital Expenditure	NPV	Net Present Value
CIT	Corporate Income Tax	OPEX	Operational Expenditure
CL	Central Line	PRMA	Petroleum Revenue Management Act
DMT	Dry Metric Ton	ROR	Rate of Return
EL	Eastern Line	TC	Total Cost
GDP	Gross Domestic Product	TR	Total Revenue
IF	Investment Framework	WL	Western Line

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INTRODUCTION

1.1. Background

Africa is endowed with huge mineral resources. The continent makes up a third of the world's mineral reserves; half of the world's platinum group metals, cobalt and diamond reserves; 40% of world's gold reserves; among the largest reserves of manganese and chromium in the world as well as a major producer of nickel, bauxite, iron ore and uranium.¹ These mineral resources when managed well can serve as a catalyst in advancing the region's development agenda and ultimately

lifting majority of its people out of poverty.

In Ghana, the mining sector has since the days of the colonial period been an important sector in the country's economy. Some of the minerals mined in the country include gold, diamonds, manganese and bauxite. Ghana is the 10th largest producer of gold in the world and the 2nd largest producer in Africa after South Africa (U.S. Geological Survey, 2016).

Table 1: Minerals produced in Ghana, 2005 - 2015

Year	Diamonds (carrats)	Bauxite (mt)	Manganese (Mt)	Gold (oz)
2005	1,065,923	606,700	1,719,589	2,138,944
2006	972,992	972,991	1,699,546	2,337,784
2007	836,488	1,033,368	1,305,809	2,628,290
2008	599,007	574,389	1,261,000	2,796,955
2009	354,443	420,477	1,007,010	3,119,832
2010	308,679	595,092	1,564,628	3,391,587
2012	215,118	662,925	1,501,033	4,337,913

¹ Africa Development Bank(2015) Unlocking Africa's Potential Developing Infrastructure Through Extractives

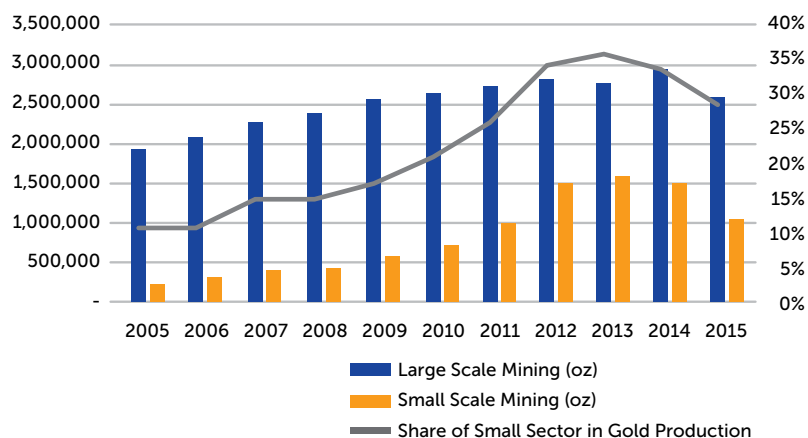
Year	Diamonds (carrats)	Bauxite (mt)	Manganese (Mt)	Gold (oz)
2013	160,821	908,586	1,724,417	4,397,241
2014	241,235	798,114	1,531,394	4,471,573
2015	174,364	1,014,605	1,562,769	3,623,742

Source: Minerals Commission

The production of precious metals in Ghana, particularly gold and bauxite, has generally been increasing since 2012. By 2015, Ghana had produced 5,212,438 carrats of diamond, 7,995,165 mt of bauxite, 16, 582,509 mt of manganese and 24,577,674 oz of gold (Table 1). Small-scale sector

contribution to overall gold production in the country has also increased significantly over the last decade (figure 1). This is an indication that Ghana's mining sector has opened up economic opportunities to local operators.

Figure 1: Share of Small Scale Sector in Gold Production

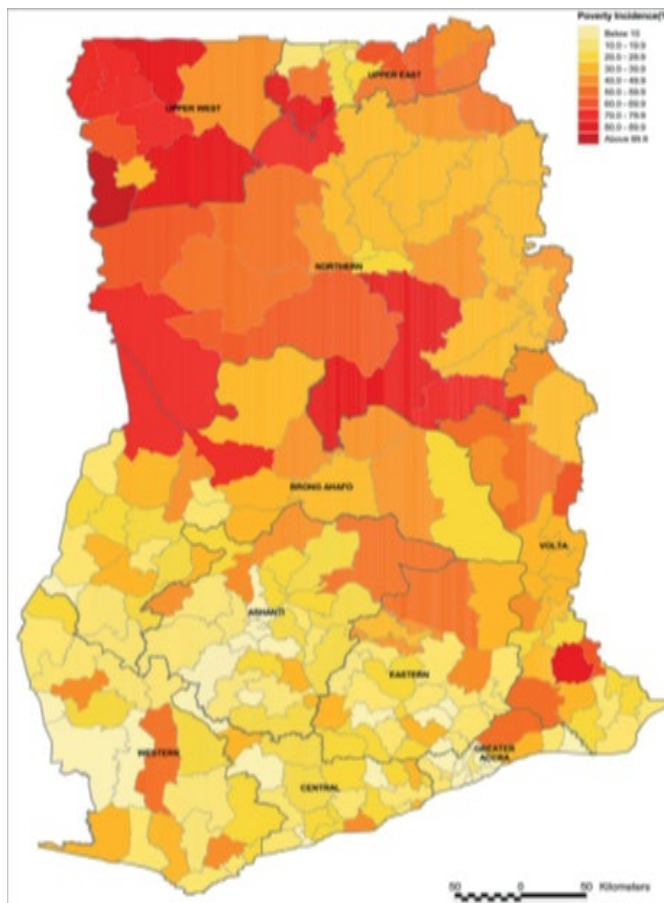


Source: Minerals Commission

According to Ghana Statistical Service (2016), the mining and quarrying sector contributed 6.3% to the country's Gross Domestic Product (GDP) in 2015.

Despite being endowed with huge mineral resources, Ghana is bedeviled with a mirage of development challenges arising from fiscal shortage, which has often led to higher fiscal deficits. 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 2015² mainly due to the IMF's fiscal consolidation program, which the country is committed to till 2017 (ACEP, 2016). 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.

Picture 1: Incidence of poverty in Ghana



Source: Ghana Statistical Service (2015)

² International Monetary Fund, IMF (2016), "Time for a Policy Reset", *Regional Economic Outlook: Sub-Saharan Africa*, April 2016.

As a result of weak finances, the government is not able to satisfactorily meet the terms of its social contract with Ghanaians. Over six million Ghanaians are still classified as poor and survive on less than 2 dollars a day. The poverty incidence in the three (3) northern regions still remain high (see Picture 1) in the country. For example, Upper East has a poverty rate of 70.7% followed by Upper West (44.7%) and Northern Region (44.2%)³. These regions are not only poor but also lack basic social infrastructure and amenities such as hospitals, roads, schools among others.

Ideally, revenues to government from Ghana's solid mineral resources should narrow the fiscal gap, reduce debt levels, and provide the government with an opportunity to undertake its development activities. However, there is evidence that government loses significant revenues from the mining sector. For instance from 2010 to 2013, Ghana received only \$1.7 billion in taxes, representing approximately 7% of the total value of Ghana's gold production of more than US\$23 billion (ACEP, 2015). While Ghana faced significant budget deficit and declining economic growth rates, the

mining industry grew with 11.7 % in 2013 (ibid). Illicit financial flows through corruption, tax evasion, illegal exploitation, and tax avoidance schemes such as transfer pricing, thin capitalization, among others, are some of the major drivers of revenue losses in Ghana's mining sector.

Ghana could gain substantial revenue from mining if the government conducted serious economic valuation of potential areas for concession. However, the granting of generous concessions to investors in Ghana's mining sector is an issue of increasing concern that needs rigorous analysis, especially at a time when the Sheini Hills Iron Ore Project, Ghana's current large-scale iron ore deposits, are yet to be developed. The Sheini Iron Ore mine, if properly managed, has the potential to open up the national economy, improve investment in the Northern Region to facilitate development and contribute to the reduction of poverty level significantly among the people of Ghana.

The Zabzugu-Tatale District will particularly benefit economically from the Sheini mine development and associated infrastructure. Majority (93.5%) of

³ Ghana Statistical Service (2015). Ghana Poverty Map Report

households in the district are engaged in agriculture; 95.9% of which are in rural localities (Ghana Statistical Service, 2014) where food is produced in abundance but traded below market value due to over-supply and lack of market. Transport and other infrastructure projects that may result from

the Sheini project will link peasant farmers in these areas with available markets in southern Ghana. Essentially, economic opportunities, incomes and overall standard of living will improve especially for women and the youth who form majority of the local population.

1.2 Objectives of the Study

This fiscal benchmarking study is a measuring exercise to ascertain the relative competitiveness of Ghana's mining fiscal terms and how equitable they are in ensuring that the government and its people benefit from the mining sector. It seeks to compare Ghana's mining fiscal policy against the fiscal provisions of the Simandou iron ore

project contract between the Republic of Guinea and Simfer S.A., to determine the level of fiscal convergence between the two projects. The findings from the analysis will provide an important guide for improving on the fiscal provisions of Ghana's mining sector.

1.3 About the Sheini Iron Ore Project in Ghana

The Sheini iron ore project is located in the Zabzugu-Tatale District in the Northern Region - in the eastern part close to the border with Togo. It is approximately 400 km north of Accra. The Sheini Hills Haematite Iron deposit contains a total Inferred Mineral Resource of 1.312 billion tonnes grading 33.8% iron⁴.

Historical records reveal that from 1959 to 1965, geologists from Russia were engaged to explore for the mineral, which they subsequently discovered in 1960. The drilling test conducted in 1961 confirmed the presence of the ore which was said to be viable and in commercial quantity. However after political disturbances in mid 1960s, the concession was left

without any productive work.

The beginning of the year 2000 witnessed the resumption of geological surveys conducted by various mining companies that expressed interest to develop the concession. They also confirmed the viability of the mineral buried under the Sheini Hills (Mase report, 2014). One of the surveys however indicated that the ore was the finest, and largest in Africa. According to the Mase report,

(2014) the analysis on the stones at Sheini Hills by some of these companies indicated that the stones were about 80.9 per cent rich in iron ore with traces of other minerals including diamond, bauxite, manganese, silica, clinker and potassium.

In 2009 about 12 mining companies expressed interest to develop the concession of which an exploration license was granted to Cardero and Emmaland Resources to explore the area.

1.4 A Brief Background about the Simandou Iron Ore Project in Guinea⁵

Simandou, a world class integrated mine, rail and port project in Guinea, aims to develop one of the largest high grade iron ore resources in the world. Two-thirds of the capital will fund the development of extensive infrastructure stretching across southern Guinea. Key components of the Project include:

- a. the Simandou Mine – an open pit iron ore mine in south-eastern Guinea;
- b. the Simandou Railway – a trans-Guinean

railway of approximately 650km to transport the iron ore from the mine to the Guinean coast;

- c. the Simandou Port – a new deep water port located south of Conakry in the Morebaya River; and associated developments to provide utilities and supporting infrastructure including construction facilities, quarries, power stations, water supply facilities, access roads and accommodation.

⁴ Cardero Resources Corp. 2013. Sheini Hills Iron Deposit, Ghana, West Africa Factsheet. Available at file:///C:/Users/Pauline%20Anaman/Downloads/Documents/Sheini_Factsheet.pdf

⁵ Source: Simandou Economic Impact Report, 2014

The Simandou Project consists of two separate mine and infrastructure entities. The mining concession is held by Simfer S.A. which is a joint venture between the Republic of Guinea, Rio Tinto, Aluminium Corporation of China (Chinalco), and the International Finance Corporation (IFC), a member of the World Bank Group. The State currently holds a 7.5 per cent stake in Simfer and has options to progressively acquire over a 20 year period up to a total of 15 per cent stake at no cost (and free carried), and a further 20 per cent contributing stake. The rail, port, and associated infrastructure will be owned, funded and built by a separate infrastructure company ("InfraCo"). InfraCo will be held by a consortium of world-class international investors with the financial resources and technical skills to deliver this world class project. Simfer S.A. will support the development of the infrastructure by being a foundation customer.

In April 2011, Simfer S.A. and the State signed the Settlement Agreement which set the path for the Project's development. It separated ownership of the mine and infrastructure assets, committed the Project's partners to undertake subsequent design and engineering stages, and required that the Project's legal and commercial foundations be laid out in a comprehensive investment charter – the Investment Framework (IF). In May 2014, the IF was finalized by the Project's partners, ratified by the National Assembly, and promulgated by Presidential decree.

The IF is a critical piece of legislation for both Guinea and the Project partners, providing the legal and commercial foundation for the project.

METHODOLOGY

2.1 Justification for the selection of Guinea as a comparator country

Guinea, like Ghana, is a West African country whose minerals sector contributes largely to its export revenues. Just as the Sheini iron ore project is the latest undeveloped mine in Ghana's extractive sector, the Simandou iron ore project is newest in Guinea. Both projects are yet to reach production stage. Also, like Guinea's Simandou iron ore project,

Sheini is one of the finest and largest iron ore ever discovered in Africa.

The table below provides detailed summary of some relevant criteria considered to situate Guinea as a comparator country for the fiscal benchmarking exercise:

Table 2: Selection criteria of Guinea as Ghana's comparator for fiscal benchmarking exercise

Country	Ghana	Guinea	Source
Iron ore reserves(tonnes)	1.3billion	Over 2 billion	Cardero Resources Group(2016) : http://www.cardero.com/i/pdf/Sheini_Factsheet.pdf and Rio Tinto: http://www.riotinto.com/guinea/simandou-4695.aspx
Iron ore production (tonnes)	-	100 million tonnes / year (Expected, first phase)	The Mining technology(2016) http://www.mining-technology.com/projects/-simandou-iron-ore-project-guinea/

Country	Ghana	Guinea	Source
GDP growth rate 2016 (%)	4.5%(projected)	3.7% (projected)	International Monetary Fund (2016): http://www.imf.org/external/country/gha/ and https://www.imf.org/external/np/sec/pr/2016/pr16198.htm
FDI Inflows 2014 (\$million)	3 357.0	566	United Nations Conference on Trade and Development (UNCTAD) (2015) http://unctad.org/sections/dite_dir/docs/wir2015/wir15_fs_gh_en.pdf and http://unctad.org/sections/dite_dir/docs/wir2015/wir15_fs_gn_en.pdf

2.2 Data sources and Input variables to the fiscal model

The study relied on secondary data collected through desktop research. Secondary sources of data included Ghana’s Minerals and Mining Act 2006 (Act 703); the Simandou agreement between the Government of Guinea and Simfer S.A.; data from multilateral institutions such as the World Bank, IFC and the African Development Bank (AfDB); research results by think tanks and

other academic papers by experts in the extractive sector; news items; and reports by audit firms, consortiums and investor companies operating within the extractive sector.

The fiscal provisions below were modelled to compare their effects on the Project Internal Rate of Return (Project IRR), Investor Internal Rate of

Return (Investor IRR), discounted and undiscounted
Government Take.

Table 3: Fiscal Terms of Ghana’s Minerals and Mining Act, and Guinea’s Simandou Contract

Fiscal Term	Ghana	Guinea
Royalty	5% ⁶	3.5%
Corporate Income Tax	35%	35%
Initial interest/State Free Equity	10%	7.5% - 15%
Additional paid up interest		≤ 20%
Loss Carry Forward	5 years	5 years
Tax Holiday	0 years	5 years
Resource Rent Tax		
	-	-
Withholding Tax on Dividend	8%	10%
Withholding Tax on Interest	8%	15%
Stabilisation Clause	Valid 15 years from date of agreement	Valid throughout project lifespan

Source: Minerals and Mining Act 2006 (Act 703 as amended); Simandou contract ⁷

⁶ Section 25 of Act 703 which provides for royalty rate of between not less than 3% and not more than 6% of total output has been amended twice; the first in 2010 to a flat rate of 5%, and the second in 2015 to a rate prescribed by the Minister of Lands and Natural Resources through the making of regulations (See <http://www.graphic.com.gh/news/politics/52836-parliament-passes-minerals-mining-law.html>). The amendment provisions of 2015 also provide that in the absence of the said regulations, the applicable royalty rate will be a flat rate of 5% provided for under the 2010 amendment provision. There has been no such regulations so far. It is thus assumed that 5% royalty rate is currently applicable.

⁷ The Simandou contract was sourced via our contacts in the World Bank country office in Guinea. The document, which was in French, was translated into English language through the assistance of contacts at the World Bank Office in Guinea as well as ACEP’s in-house resources.

2.3 Justification for the Choice of the Sources of Fiscal Provisions

A country's minerals and mining law defines the framework for negotiating the fiscal terms of any particular contract. Fiscal terms of any particular contract in a country may therefore differ from the country's statutory fiscal provisions. They may also differ from one contract to another in the same country, as well as from contracts regarding similar fields in other countries.

Contract to contract or statute to statute analysis of fiscal provisions under the Simandou and Sheini iron ore projects would be the ideal approach in this fiscal benchmarking study. However, while the Simandou contract is a fully negotiated and ratified development contract between the government of

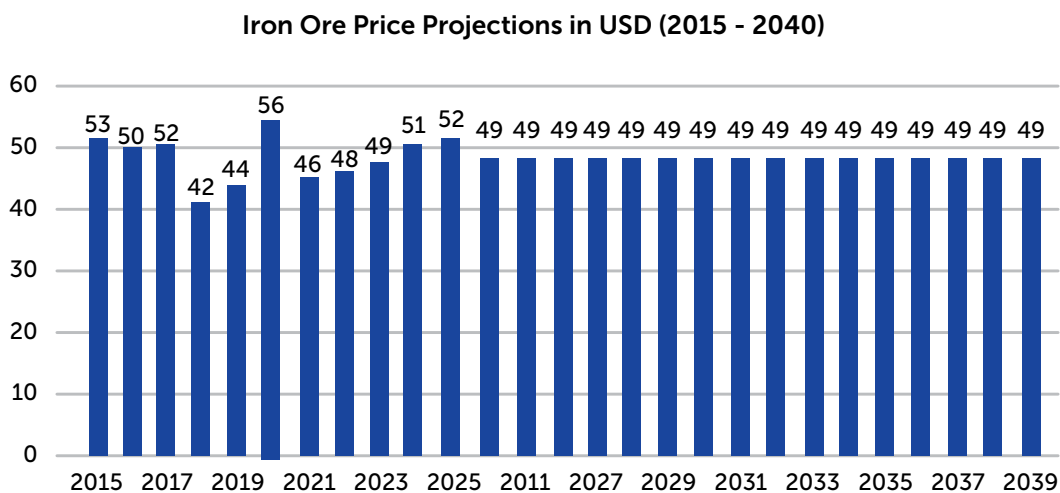
Guinea and Simfer S.A. (the investors), there is yet to be any such development contract for the Sheini iron ore project in Ghana. A contract to contract comparison was therefore impossible. It was also not optimal to compare the fiscal provisions of the minerals and mining laws of both countries because doing so will conceal the true (probable) outcome of the Simandou deal.

The third best option therefore was to compare the fiscal provisions of the Simandou contract with Ghana's statutory fiscal provisions to draw lessons from Simandou for Ghana's future engagements with investors for the development of the Sheini iron ore mine.

2.4 Primary Project Assumptions

1. Project lifespan: 2015 – 2040 (25 years)⁸
2. Production begins: 2019
3. Production level: 100 million metric tonnes per annum⁹
4. Price per annum: As presented in the figure below
5. Average real commodity price/dmt (base price) upon production: \$51.32¹¹

Figure 2: Iron Ore Price Projection 2015 - 2040



Source: World Bank commodities price forecast (nominal US Dollars); Bloomberg (2016); Author's computation ¹⁰

⁸ The Simandou Contract which was signed between Simfer S.A. and the Government of Guinea was ratified by the National Assembly in 2014 is for an initial period of 25 years.

⁹ About Simandou. Available at <http://www.riotinto.com/guinea/about-simandou-10974.aspx>

¹⁰ World Bank price projections were released on 26 July 2016. Bloomberg provides updated information about World Bank revised projections for 2016, 2017 and 2020. For the sake of uniformity, actuals for 2015 and 2016 were excluded.

¹¹ Calculation of average real price figure: (World Bank price projections for 2015-2025 + average of World Bank price projections for 2015-2025 (\$49.35) as price per year for the remaining period (2026-2040)) ÷ 25 years.

6. Capital cost: \$18 billion ¹²
7. Discounting rate: 12%¹³
8. Operational cost/dmt: \$1.52. This translates into \$152 million per annum (See Appendix 1 for the

computation of the operating cost).

Further assumptions were made at various stages of the analysis. These have been clearly stated in the relevant stages.

2.5 The Fiscal Benchmarking Process

A quantitative approach was adopted in the 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 Simfer S.A. Agreement and Ghana's Mineral and Mining Law (Act 703) (stated above)
- ii. Petroleum costs, both capital and operational, were based on estimated cost of the Simandou project as input cost
- iii. Baseline analysis was conducted comparing the revenue and investment impact of the fiscal terms of Sheini (Act 703) against those of the Simfer S.A. Agreement
- iv. Sensitivity analyses were also done to determine the revenue and investment impact of changes in iron ore 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 and Guinea.

¹² African Development Bank Group (2016) AfDB and Guinea sign key financing agreements to boost Simandou project and improve public finance system. Published on 20/07/2016. Available at <http://www.afdb.org/en/news-and-events/article/afdb-and-guinea-sign-key-financing-agreements-to-boost-simandou-project-and-improve-public-finance-system-15965/>

¹³ Industry average

ANALYSIS OF PROJECT ECONOMICS

The results of the fiscal modelling exercise are presented and discussed in this chapter. Section 3.1 introduces some concepts, namely discounted government take and the different shades of Internal Rate of Return (IRR) that are foundational to this study. Section 3.2 features the analysis and discussion of the fiscal benchmarking modelling

results at base price for the two iron ore projects. Sensitivity analysis is done in section 3.3 to test the impact of changes in price on project economics of Simandou and Sheini. The final section discusses the counterfactuals of the modelling results by detangling Sheini from the geological and project context of Simandou.

03

3.1 Key Concepts in this Analysis

3.1.1 Frontloading, Discounting Factor and Discounted Government Take

Discounted government take is the present worth of future government revenues at an appropriate discount rate. Due to the effects of inflation and the time value of money, discounted figures are traditionally lower than undiscounted figures. Therefore the confusion usually arises when discounted government take is higher than undiscounted government take for certain fiscal regimes as would be seen later in this chapter. But 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, import duties, surface rent, and others are weightier than late cash flows such as CIT.

In this subsection, a simple NPV formula is used to show that the present worth of 3.5% and 5% royalty collected earlier over the lifespan of an iron mine project will be higher than if collected later. The higher the royalty, the bigger the discounted government take (See Appendix 2 for the computations). The computations were based on the following assumptions which also informed

all other analysis in this report.

- a. Royalty: 3.5% and 5%
- b. Royalty base is the gross mineral revenue (average price * production level each year).
- c. Average price: \$51.32
- d. Production begins: 2019
- e. Production level: 100,000,000 dmt per annum, beginning 2019
- f. Project unexpired term: 24 years (2016 – 2040)
- g. Discount rate: 12%
- h. Discounting year: 2016
- i. Discounting factor: $(1+r)^{-n}$, where r is the discount rate and n is the discounting period.
- j. Net Present Value (NPV) formula: $c(1+r)^{-n}$, where c is royalty value and $(1+r)^{-n}$ is the discounting factor.

3.1.1.1 Some Observation

The computations in appendix 2 show that the earlier the revenue, the higher the discounted government take. The present worth of 3.5% tax on gross mineral revenue over a 3-year period is \$127,853,516. This is higher compared to \$11,836,958 over a 24-year period. This is because the discount factor $((1+r)^{-n})$ reduces over longer

years as seen in the case of discount factor of 0.0659 over 24 years compared to discount factor of 0.7118 over 3 years.

It also follows that when royalty is higher than 3.5%, discounted government take is expected to be higher and vice versa. For example: Government take of 5% royalty on gross revenue over the next 3 years and 24 years will be \$182,647,880 and \$16,909,940 respectively, compared to \$127,853,516 and \$11,836,958 respectively at 3.5% royalty. It will be seen in the subsequent analysis that the country with higher discounted government take has higher frontloading provisions.

Royalty is an early payment mining companies make to the host governments compared to other payments like corporate income tax. Discounted take will therefore be higher by default for countries that receive royalties than for countries that do not. However, among royalty-receiving countries, discounted government take is higher for countries that quote higher royalty rate, all other things being equal.

3.1.2 Net Present Value, Project IRR, Investor IRR and Differential IRR

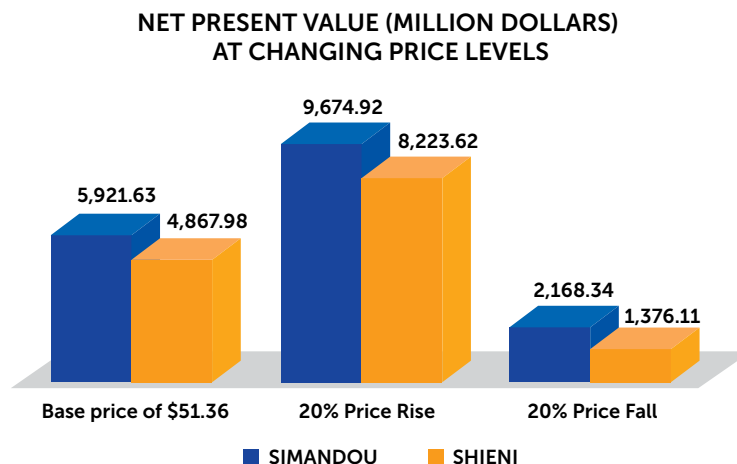
Net Present Value (NPV) is the present worth of future cash flows which are discounted over time at an interest rate. Internal rate of return (IRR) is the interest rate at which the NPV of all the cash flows (both positive and negative) from a project or investment equal zero. At zero NPV, a project or an investment breaks even. Internal rate of return is therefore used to evaluate the attractiveness of a project or investment.

A distinction must be made between Project IRR and investor IRR. Project IRR is based on cash flows to the project without consideration of financing cash flows. Investor IRR on the other

hand considers cash flows net of financing and therefore represents the rate of return of a project to the investor for equity financing. If a project is fully funded by equity, the investor IRR will be equal to the project IRR. Investor IRR and Project IRR will differ if a project is funded by a mixture of debt and equity. Differential IRR (Investor IRR - Project IRR) measures the extent of profitability of a project.

An investor will decide to undertake a project if the IRR provides positive NPV at best or zero NPV at worst. In the figure above, we show that the Simanou and the Sheini iron ore projects are profitable to undertake because they both post positive NPVs. However, NPV will improve if price levels are high and decline if price levels are low.

Figure 3: Net Present Value of the Simandou and Sheini Iron Ore Projects



Source: Author's Computation

While positive NPV, particularly at base price of \$51.32/dmt, depict better IRR to an investor the Simandou project provides higher project and investor IRR than the Sheini project.

3.2 A Base Price Scenario of the Project Economics of the Simandou and Sheini Iron Ore Projects from an Investor and Government Perspective

In this analysis, it has been assumed that the Simandou and Shieni iron ore projects are both financed by a mixture of debt and equity based on a ratio of 2.3:1¹⁴, hence the investor IRR (leveraged) is higher than project IRR. The figure below shows that Simandou and Sheini iron ore

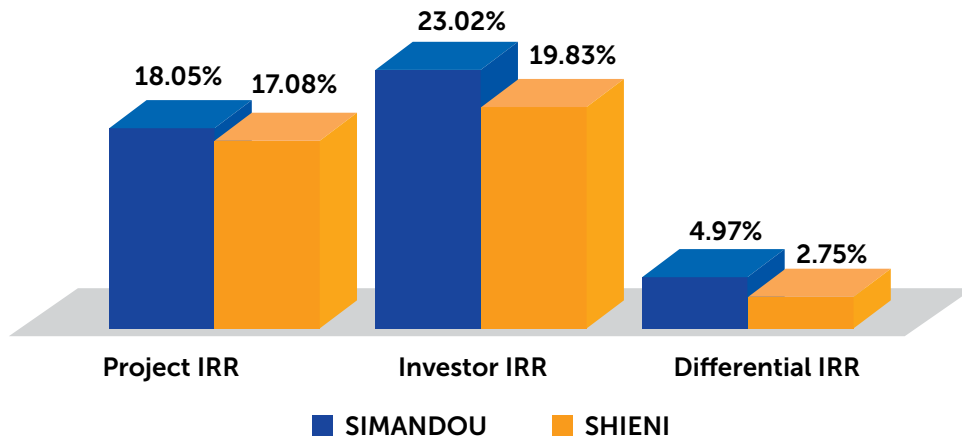
¹⁴ Given that this is a comparative study between projects in Guinea and Ghana, we took an average of the thin capitalization ratio of the two countries, which approximates a debt-equity of 2.3:1. See page 135 of Deloitte's (2015) Guide to fiscal information for Guinea's debt-equity ratio. Available at file:///C:/Users/Pauline%20Anaman/Downloads/Documents/ZA_Fiscal_Guide_2015_29012015.pdf

projects each promise positive rate of return to the investor. However, a comparison of the differential IRR (Investor IRR – Project IRR) depicts higher profitability for Guinea’s iron ore project than Ghana’s Shieni by a 2.22% margin. Higher

profitability of the Simandou project is as a result of the generous fiscal terms that the Guinean Government granted to SIMFER SA to incentivize the investors to develop the mine and the local economy.

Figure 4: Profitability to the Investor at Iron Ore Base Price of \$51.32/dmt

PROJECT PROFITABILITY AT BASE PRICE OF \$51.32



Source: Author’s Computation

According to Article 25.1.4 of the 2014 Simandou contract, the total amount of interest and fees owed by SIMFER S.A under the underwritten loans and advances are tax deductible. In addition to the 5 years tax holiday granted to the investors, the

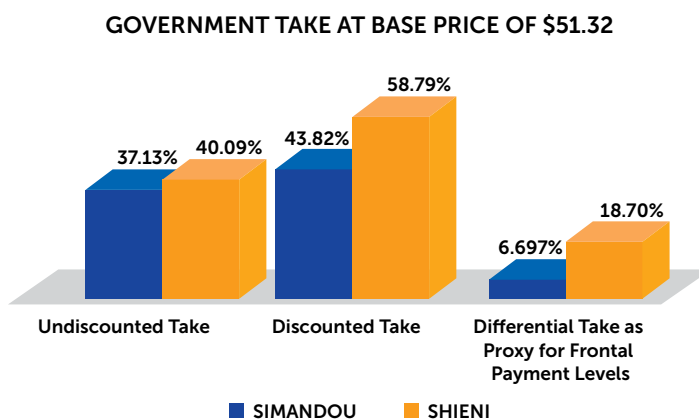
Government of Guinea also offers 5% credit for any investments made by the investors during the year. This allowance is deductible in calculating the taxable profit. Similarly, SIMFER SA is required to invest up to 0.25% of its annual turnover, either in

cash or in kind, in local content and local economy development. This contribution is also deductible from taxable income. In the case of Ghana, the positive rate of return of the Sheini project can be explained by tax deductibility of payments to debts (interests) in accordance with Ghana's tax laws. The new Income Tax Act 2015 (Act 896) introduces thin capitalization 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 (ACEP, 2016). Unlike Guinea, Ghana is yet

to sign a contract with an investor to develop the Sheini mine. There is therefore that likelihood that profitability to the investor in the Sheini project will change depending on the fiscal terms of the prospective contract.

For both the Simandou and Sheini projects, investors' dividends improve due to tax savings. Consequently, project IRR remains unaffected and investor IRR is higher than project IRR. The adverse implications of generous fiscal terms is that it reduces the tax base and revenues to the government (figure 5).

Figure 5: Sheini and Simandou Contribution to Government at Base Price of \$51.32/dmt



Source: Author's Computation

All other things being equal, the Government of Ghana's take in Shieni is better than that of the Government of Guinea in Simandou by approximately 7 percentage points in undiscounted terms and 19 percentage points in discounted terms. That both projects record higher discounted government take than undiscounted take depict that both governments receive early revenues such as royalties. Royalties are based on the gross revenues that accrue to the project and are therefore weightier than late cash flows such as profits-based taxes. Thus the higher differential take of Sheini as shown in figure 5 is as a result of the higher royalty rate (5%) that Ghana's Minerals and Mining Act 2006, Act 703 imposes on the investor compared to Guinea's 3.5%.

The Government of Guinea's forfeiture of significant revenues through the generous fiscal terms it provides to investors may be an attempt to neutralize the effects of the country's poor performance on some important investment attraction indicators (table 4). Political risk indices by the World Bank and PRS Group see Guinea's political environment as riskier than Ghana's. While Ghana has since 1992 achieved stable democracy, Guinea is still consolidating its democracy¹⁵. For more than 15 years of Rio Tinto's presence in Guinea, it was not until 2014 that a contract was concluded between Simfer S.A and the Government of Guinea following a successful election and constitution of the National Assembly which ratified the contract that same year.

Table 4: Some Key Indicators that Matter for Extractive Sector Investment Attraction in Ghana and Guinea

Indicator	Ghana Score/ Ranking	Guinea Score/ Ranking	Citation
Political Stability and Absence of Violence/ Terrorism Index (%) 2014	40.78	15.53	WorldBank (2014) http://info.worldbank.org/governance/wgi/index.aspx#reports and http://info.worldbank.org/governance/wgi/index.aspx#reports

¹⁵See note from Allan Davies, President of the Simandou Project, on page 1 of SIMFER SA's September 2014 Simandou Economic Impact Report. Available at file:///C:/Users/Pauline%20Anaman/Desktop/REPORTS%20AND%20ANALYSES/SIMANDOU%20PROJECT/RT_Simandou_Economic_Impact_Report_EN.pdf

Indicator	Ghana Score/ Ranking	Guinea Score/ Ranking	Citation
Regulatory Quality (%) 2014	50.96	12.50	WorldBank(2014) http://info.worldbank.org/governance/wgi/index.aspx#reports and http://info.worldbank.org/governance/wgi/index.aspx#reports
Investment Attractiveness Index 2014	60.4	48.5	Frazer Institute (2014) https://www.fraserinstitute.org/sites/default/files/survey-of-mining-companies-2014.pdf
Policy Perception Index Ranking 2014	57.97	31.97	Frazer Institute (2014) https://www.fraserinstitute.org/sites/default/files/survey-of-mining-companies-2014.pdf
Political Risk Index 2014	70	54	PRS Group(2016) http://www.prsgroup.com/category/risk-index
Ease Of Doing Business 2016	114	165	World Bank (2016): http://www.doingbusiness.org/data/exploreeconomies/ghana/ and http://www.doingbusiness.org/data/exploreeconomies/guinea/
BPMP Ranking 2014	54/122	60/122	Frazer Institute (2014) https://www.fraserinstitute.org/sites/default/files/survey-of-mining-companies-2014.pdf
Current Practices Mineral Potential Index Ranking 2014	42/122	99/122	Frazer Institute (2014) https://www.fraserinstitute.org/sites/default/files/survey-of-mining-companies-2014.pdf

Source: Frazer Institute, PRS Group and World Bank

A stable political environment can reasonably translate into regulatory quality as evidenced by Ghana's better performance in this regard, per the World Bank's 2014 rating. Frazer Institute's 2014 Current Practices Mineral Potential Index measures whether or not a jurisdiction's mineral potential under the current policy environment (i.e., regulations, land use restrictions, taxation, political risk, and uncertainty) encourages or discourages exploration investments in the mining sector. Ghana ranked 42nd out of 122 countries

while Guinea ranked 99th of 122 countries. This means that Ghana's iron ore mine, although smaller in scale than Simandou, will be an investor's first choice for exploration because of lower non-technical risks associated with the project. Considering that Ghana performs better than Guinea on many fronts, the government of Ghana has strong leverage that may be instrumental in negotiating fiscal terms with prospective investors to develop the Sheini iron ore mine so that there is a balance of investor and government interest.

3.3 Sensitivity Analysis

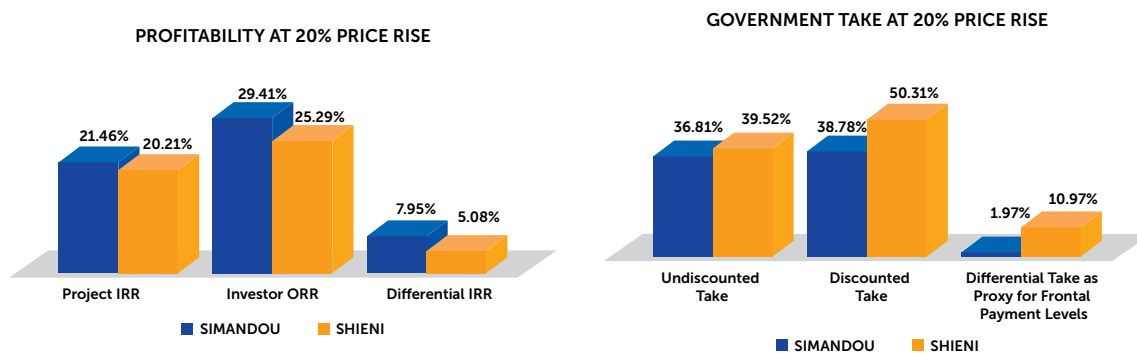
The sensitivity tests to determine the progressivity of the mining fiscal regimes in Ghana and Guinea show that for most parts, the regimes are regressive. This conclusion is discussed under a changing iron ore prices scenario.

3.3.1 Profitability and Government Take at 20% Price Rise from Base Price

The intuition about profitability and government-take of a project is that there should be positive

relationship between these and iron ore prices assuming that total cost, production level and fiscal terms are constant. Essentially, rising iron ore prices will simultaneously have positive effect on investor profitability and government take. In the figure below, we show contrarily that the modelling results are counter-intuitive; a rise in iron ore price will increase profitability to the investor but reduce government take than at base price.

Figure 6: Profitability and Government Take at 20% Price Rise from Base Price



Source: Author's Computation

When iron ore price rises from the base price by 20%, both project IRR and investor IRR increase from base by 3.41% and 6.38% respectively for the Simandou project, and by 3.13% and 5.46% respectively for the Sheini project. While this is an indication that both projects remain profitable, Simandou retains higher profitability because differential IRR improves from base by 2.98% compared to Sheini's 2.33% improvement. Both governments are however unable to optimally capture value from the mineral resource. Take to the Guinean government declines from base price levels by 0.32% and 5.04% in undiscounted and discounted terms respectively. Similarly, the

government of Ghana sustains fiscal loss from the Sheini iron ore mine to the tune of 0.57% (undiscounted) and 8.48% (discounted). The extent of decline is steeper for the Government of Ghana.

3.3.1.1 The Effects of Resource Rent Taxes

The notable factor that explains the declining government take when iron ore price rises is the absence of resource rent taxes in the Simandou contract as well as Ghana's Act 703. In times of commodity price boom, the investor is able to recoup his costs, achieve normal profit and even retain additional profits beyond normal assuming constant total cost and output. Meanwhile the

fixed nature of royalties and corporate income tax (CIT) hinder government's ability to benefit from the investor's economic rent arising from price rise. At a higher price level, fiscal provisions under Simandou and Sheini are thus more favorable to the investor.

Fiscal terms, through progressive taxes, must be flexible enough to ensure fairness and balance the interest of both the investor and the government¹⁷. In Ghana, mineral royalties used to be in the range of 3%-6% but this was converted into a flat rate of 5% effective 19 March 2010¹⁸. Hitherto, mining companies took advantage of the cumbersome nature of royalty calculation amidst a myriad of other tax administration challenges to pay 3% royalty ceiling. The 5% flat rate was a subsequent policy response to simultaneously make tax

calculation simple while increasing revenues to government. Despite this change, the flat royalty rate does not respond to increasing commodity price as seen from the analysis in subsection 3.3.1, and is detrimental to the government's coffers. Resource rent tax is therefore necessary to capture excess profit that investors make.

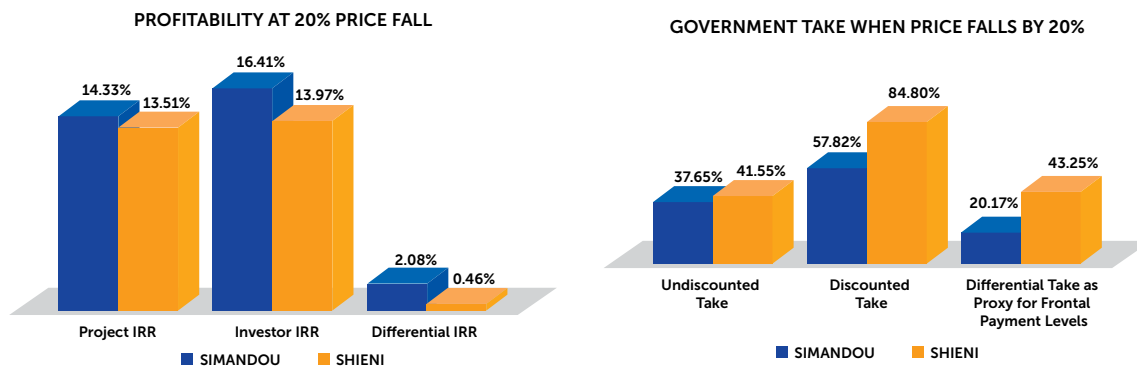
3.3.2 Profitability and Government Take at 20% Price Fall from Base Price

All other things being equal, the investor suffers the most under very depressing price conditions. Per the modelling results (figure 7) investor profitability declines while government take improves when price falls from base price by 20%. In the case of Simandou, differential IRR declines by more than 50% from baseline level. For Sheini, differential IRR declines from base level by 83.3%.

¹⁷Bryan C. land (2008). Resource taxation - theory and experience. A draft paper for the IMF conference on Taxing Natural Resources: New Challenges, New Perspectives, September 25-27, 2008.

¹⁸PwC. (2012). Corporate Income Taxes, Mining Royalties and other mining taxes – 2012 update. Available at file:///C:/Users/Pauline%20Anaman/Downloads/Documents/pwc-gx-mining-taxes-and-royalties_2.pdf

Figure 7: Profitability and Government Take at 20% Price Fall from Base Price

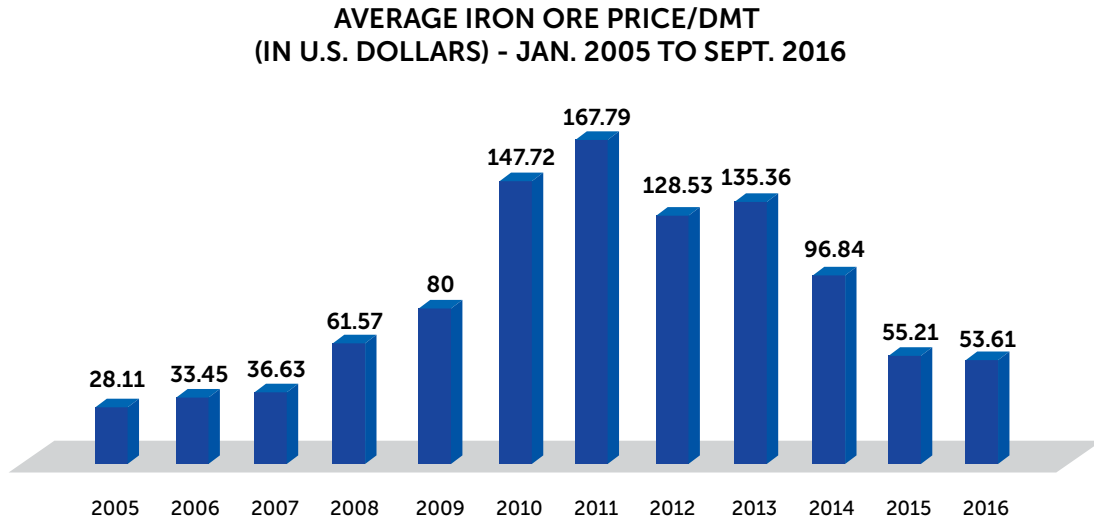


Source: Author's Computation

Profitability declines for the investor because at constant production level, gross revenue declines. In the instance where the investor exactly breaks even (he enjoys no profit yet makes no losses) or sustains some losses, the host government is nonetheless assured of its royalties and other upfront payments even before the investor deducts costs. For the Simandou and Sheini iron ore projects, the respective governments will be entitled to charge 3.5% and 5% royalty on gross revenue irrespective of whether or not the investors make profit. This explains why undiscounted and discounted government take increase from base levels by 0.52% and 19.04% respectively under

the Simandou project, and by 1.49% and 26.01% respectively under the Sheini iron ore project. Sheini continues to provide higher take to government. Simandou remains undeveloped due to a confluence of factors, including the decline in iron ore prices. Over the past decade or so, iron ore prices have risen and fallen, reaching a peak of \$167.79/dmt in 2011. Although iron ore prices recovered in 2013 after a sharp decline from peak price in 2012, the price was not as good as in 2011. Iron ore prices have declined sharply since 2012, reaching an average low of \$53.61 per metric ton as at September, 2016 (Figure 8).

Figure 8: Historical Iron Ore Prices (Annual Average) from January, 2015 - September, 2016



Source: Index Mundi; available at <http://www.indexmundi.com/commodities/?commodity=iron-ore&months=240>

The World Bank's projections of iron ore prices for nearly the next decade show continuous decline. The decline in iron ore prices have largely been attributed to global oversupply and moderating demand for iron ore. The reigning narrative therefore is that should Simfer S.A. develop the Simandou iron mine, chances are that prices will remain low and project profitability will look bleak

as Simandou will increase the already abundant supply of the commodity.

The bankable feasibility study which the partners submitted to the government of Guinea during the first half of 2016 shows that Simandou is a very expensive project to develop within the current market conditions¹⁹. From Rio Tinto's perspective,

¹⁹Andrew Topt (2016). Iron ore surges past \$55 as Rio Tinto exits Simandou. Published on 4 July 2016. Available at <http://www.mining.com/iron-ore-surges-past-55-as-rio-tinto-exits-simandou/>

the development of the Simandou iron ore mine has become unprofitable to undertake. Consequently, Rio Tinto's media release dated 28 October 2016 confirms the company's intention to, within the next 6 months, conclude the sale of its 46.6% stake to Chinalco²⁰. According to Bloomberg (2016), the World Bank Groups' IFC which owns 4.6% stake in the Simandou project intends to exit and recoup its costs after 10 years as partner²¹.

What this means for the Sheini iron project is that investors will be willing to bid for, and develop, the mine if iron ore prices improve above current level. Information from Ghana's Ministry of Lands and Natural Resources indicate that Cadereo, the Canadian company that was awarded license to explore the Sheini hills and if successful enter a development agreement with the Government of Ghana, has withdrawn. It is not clear whether or not slumping iron ore prices informed the withdrawal.

3.4 Juxtaposition of Simandou and Shieni Iron Ore Project Economics against Reality

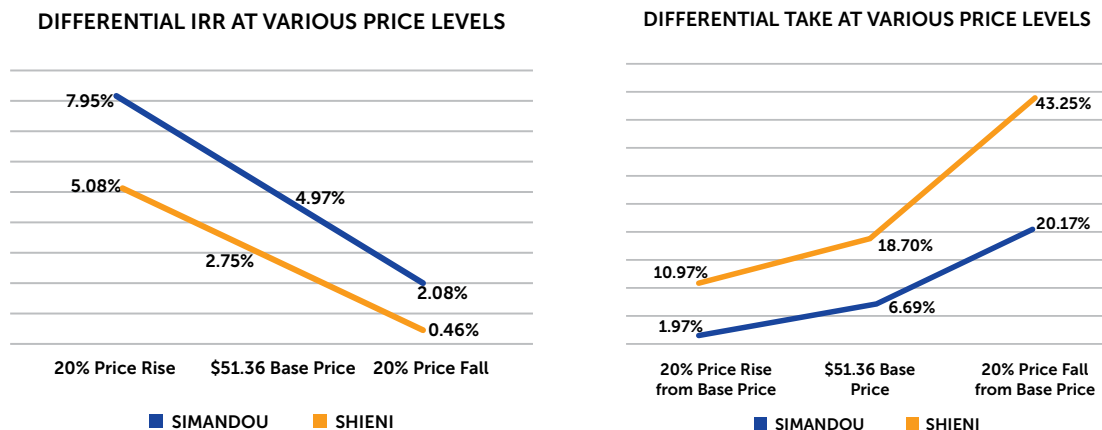
The modelling results show that for both the Simandou and Sheini projects, profitability to the investor increases as price increases, and declines

as price declines. On the other hand, government take declines as price increases and increases as price declines (Figure 9).

²⁰Rio Tinto agrees Heads of Agreement to sell its stake in Simandou Project to Chinalco http://www.riotinto.com/media/media-releases-237_19886.aspx

²¹Richard Duprey (2016). Did the World Bank just kill Rio Tinto's massive Simandou iron ore project? Fox Business. Published on 18 October 2016. Available at <http://www.foxbusiness.com/markets/2016/10/18/did-world-bank-just-kill-rio-tinto-massive-simandou-iron-ore-project.html>

Figure 9: Differential IRR and Differential Government Take at Various Price Levels



Source: Author's Computation

Also, at the various price levels, profitability remains higher in Simandou than in Sheini but government take remains higher in Sheini than in Simandou. This shows that given the same conditions, the fiscal contribution of Sheini to the government of Ghana is better than Simandou's contribution to the Guinean government's coffers.

In reality, however, the scale of the iron ore mine

in Simandou is larger with larger infrastructural demands than Sheini. Sheini may therefore not necessarily require the \$12 billion investment in infrastructure and \$6 billion investment to develop the mine as Simandou requires. Moreover, Simandou is one of the most easily exploitable iron ore fields outside of Australia's Pilbara region and top producer Vale's Brazilian home base²². Therefore, operating cost will also differ significantly

²²Cecilia Jamasmine (2016). Rio Tinto forges ahead with Simandou, the world's largest mining project. Published on 17 May, 2016 at 3:43 AM. Available at <http://www.mining.com/rio-tinto-forges-ahead-with-simandou-the-worlds-largest-mining-project/>

for the two mines depending on certain variables including economies of scale that Simandou may enjoy to beat down cost. Moreover, the Sheini mine will produce lower quality ore (33.8% Fe)²³ in lesser quantity than Simandou's 100 million tons per annum of high quality ore grade (66% – 68% Fe)²⁴. Sheini will therefore attract lower prices for its ore while Simandou will attract premium prices. Since gross revenue which forms the basis for Ghana's ad valorem royalty system is a function of price and quantity, Sheini's fiscal contribution to the government of Ghana may thus be lower than Simandou's contribution to the Government of Guinea assuming that the statutory fiscal terms are maintained in Sheini's development contract. Under good market conditions, Simandou will generally enjoy better economies and may thus simultaneously provide higher profitability to the investor and more revenues to Guinea's national purse than Sheini may provide for its stakeholders in Ghana. For both projects however, slumping iron ore prices may not make them feasible to operate.

3.4.1 The Effects of Stabilization Clause

Stabilization clause is a key aspect of a mining

agreement that investors are sure to secure. It shields them from new policies and events that may adversely affect their bottom-line. Under the Simfer S.A. agreement, the Government of Guinea consented to an unending stability clause which freezes the fiscal provisions for the entire period that the Simandou project will operate. Guinea may never benefit from the economic rent investors may enjoy during price hikes.

In the case of Ghana the purpose of the 15-year stability clause, commencing from the day of agreement (Section 48 of Act 703), is to ensure that the holder of the mining lease is not adversely affected by the subsequent changes in...(i) the level of and payment of customs or other duties relating to the entry materials, goods, equipment and any other inputs necessary to the mining operations or project, (ii) the level of and payment of royalties, taxes, fees and other fiscal imports, and (iii) laws relating to exchange control, transfer of capital and dividend remittance" (Section 48(b) of Act 703). Unlike the Simandou contract, section 48 of Act 703 allows the government of Ghana to review fiscal provisions to respond to changing realities.

²³

²⁴*ibid*

However, should the government grant generous terms in Sheini's development agreement with the aim of incentivizing investors, the country would be shortchanged in the long term if, inter alia, iron ore prices continue to fall.

That notwithstanding, while both countries risk losing some revenues in times of price hikes over the stabilized periods, stabilization clauses also benefit governments by guaranteeing revenues especially during depressing market conditions. In conclusion, under the fiscal benchmarking study

Ghana's fiscal provisions in Act 703 were analyzed within the same geological and investment context as the fiscal provisions of the Simandou contract to assess the extent of the competitiveness and fiscal contribution to the government of the Sheini iron ore project. Under different price scenarios, Sheini promises higher government take than Simandou but Simandou promises higher returns to the investor than Sheini. In reality, however, the unique characteristics of each of the project, coupled with market conditions, may produce different results than modelled.

ANALYSIS OF PROJECT INFRASTRUCTURE

At the heart of an effective mine operation is the availability of domestic transport infrastructure to convey output from site to the world market. In the absence of adequate infrastructure, the investor will weigh the cost of infrastructure development against the overall return prospects of the mine project to decide on whether or not to go ahead with the project. In the case of Simandou, two-thirds of the 18 billion capital investment goes into the construction of a 650km trans-Guinean railway to transport the iron ore from the mine to the Guinean coast; a new deep water port located south of Conakry in the Morebaya River; and associated developments to provide utilities

and supporting infrastructure. One of the reasons the Simandou mine is yet to be developed is the unsuccessful attempts by Simfer S.A to raise the needed capital and/or find an interested investor to build and manage the said infrastructure. This chapter focuses on Sheini's transport infrastructure requirements and the various options available to the government of Ghana and prospective investor(s) for the smooth operation of the Sheini project (see section 4.2). To understand the infrastructure needs in Ghana, however, it is important to first assess whether or not existing infrastructure can support the project. This is set out in section 4.1.

4.1 An Analysis of Existing Infrastructure in Ghana

Unlike Simandou, investors in Sheini iron ore mine may not have to invest in a new port facility in the South. As seen from picture 2 below, Ghana has two operational ports in Takoradi and Tema that can connect Sheini to the global market. However, communication lines between Sheini and the ports must be built.

4.1.1 The Tema and Takoradi Ports

The Tema Port was commissioned in 1962 after an 8-year construction period. In 1963, Tema Port had its first tanker vessel call berthing and discharging 17500 tonnes of crude oil. From 1997 the expansion of quay two began with dredging of the port's turning basin and the waters

alongside berths one (1) and two (2). By 2005 the first phase of the planned dedicated container terminal spanning 250,000sqm within the main harbor were completed. Various reconstruction and restructuring activities run parallel to these developments. These included privatization of some major port services like stevedoring and shore handling; ISPS Code implementation and compliance. By 2008 the port had exceeded its 500,000 TEU target expected for 2010 and thus began to work towards the developments stated in its master plan for the future. Seventy-five per cent (75%) of stevedoring services were privatized with the Port Authority handling 25%. There was similar expansion in private ancillary port services; off dock terminal activities, warehouses, and bunkering and ship chandlery services amongst others. Projects

completed in Tema Port in 2016 include:

1. A 450m long by 50m wide bulk jetty capable of berthing four vessels at the same time. The facility has increased the port's berthing capacity from 14 to 16 berths.
2. A new dedicated 840 point reefer terminal which includes offices for regulatory stakeholders within the reefer clearance chain.
3. A new revenue Centre for one stop processing of all port payments this is located strategically by the customs long room to make it easier for port users.
4. A concrete net mending wharf with a solar lighting system to facilitate the activities of local artisanal fishermen as part of the Port Authority's Corporate Social Responsibility Initiatives²⁵.

²⁵Ghana Ports and Harbours Authority. Available at <http://www.ghanaports.gov.gh/page/15/Our-History-And-Future>

Picture 2: Existing Infrastructure in the Sheini Area



Source: Cadero Resources Corp., 2013

The initial capacity of the Takoradi port was 1 million tons of cargo. After two major expansions, the port in 2015 handled 68% of national seaborne exports. Plans are currently underway to modernize and expand the port. The expansion exercise involves access channel dredged to 16metres; extension of breakwater 1.08 Northward; construction of bulk terminals with 16meters depth; construction of oil services terminal; reclamation of 53,000 hectares of land; construction of open storage area for oil field, plant and machinery; and construction of dual access roads to the port. Upon completion, solid minerals including iron ore from Sheini and other bulk cargo operations will be transferred to the new jetty²⁶.

4.1.2 Major Road Infrastructure

Sheini is about 400 kilometers north of Ghana's capital city. There are major roads that connect the Northern Region, where Sheini is located, through Kumasi to the ports in the South. These roads are mainly used by commercial and private motorists. Heavy trucks transporting iron ore by road will destroy roads and cause traffic. Moreover, because

the existing transport infrastructure is not direct, iron ore transportation may delay with security implications. It becomes necessary therefore to explore other alternatives.

4.1.3 Existing Railway Network

According to the Ghana Railway Development Authority (2013), existing railway network, which is predominantly single-tracked "...forms almost a triangle with its vertices in Takoradi and Accra, about 200km apart along the southern coast of Ghana, and Kumasi about 250km inland. The 267-kilometer Western Line (WL), one of the three main lines of the railway network, is the most active and economically important railway line in Ghana. It links the Takoradi Harbor to Kumasi along 47 stations at a maximum speed of 56 kilometers per hour (56 km/h). On the other hand, the 329.5-kilometer Eastern Line (EL), which is not operational due to its poor state, also links Accra and Kumasi. Its branch line from Achimota to the Tema Port has however been rehabilitated for operation.

²⁶Ghana Ports and Harbours Authority. Available at <http://www.ghanaports.gov.gh/page/27/Takoradi-Port-Our-History-And-Future->

4.2 Analysis of Alternative Transport Infrastructure Options to Connect Sheini to the Ports

Understanding various transport infrastructure options available to an investor in the Sheini iron ore project will inform a choice that is cheaper, better, and faster. This section critically analyses a transport survey conducted by Cadero Resources Corporation to arrive at a conclusion that of all the options available to the investor (subsections 4.2.1-3) a railway network investment is the most desirable within the context of Ghana's (railway) infrastructure development plan.

4.2.1 Mineral Slurry Pipelines

The transportation of minerals via slurry pipelines has become popular to the mining industry because they are considered one of the most environmentally responsible and economically

viable options. Once mined, the ore is mixed with water and transported via the pipelines to the end destination. Such pipelines generally transport ore over very long distances where it is processed. Slurry pipes are likely to cover a smaller surface area. This would limit the damage to farms and properties of persons living in towns and villages on the corridor of the pipe. These notwithstanding, there are associated disadvantages of slurry pipelines if incorporated within the Sheini project.

First, there is the risk of environmental pollution. The ore would have to be mixed with water at Sheini and transported to the Port where it has to be separated again.

Picture 3: Slurry Pipeline Waste Disposal



Unless there is a return pipe that would send the waste water back to the project site the disposal of the water at the port becomes very critical. If not properly treated, water bodies and the environment will be susceptible to pollution. Moreover, environmental pollution will compound upon decommissioning, if the pipeline becomes redundant.

Secondly, it presents little or no positive economic spill-over effects on the local economy. Much

of the connection between the southern and northern parts of the country is by road. Most of these roads are not well developed to transport goods and other commodities from the farming communities in the northern parts of the country to the southern part, where economic activities seem to be concentrated. The Sheini iron ore project should present an opportunity for infrastructure development that will benefit the local communities within and beyond its radius. The slurry pipeline option will not open the

hinterland to the southern part of the country. This would have a negative impact on the economic development of the country.

4.2.2 Rail Infrastructure

Railways, unlike roads, are faster and motorable throughout the year because the rail system has relatively little or no traffic. An investor may consider three options to railway infrastructure development.

4.2.2.1 Option One: Rehabilitation and Extension of Existing Railway Lines

Option one of railway infrastructure may be to rehabilitate and extend existing rail lines that link Accra and Kumasi, and to extend new lines from Kumasi to Yendi, towards Burkina Faso.

This option makes economic sense because it would open up the markets between the northern and southern parts of the country. Yendi, Tamale, Kumasi, Sunyani are some of the major towns that could benefit from this rail line aside the agro-based communities that exist along the corridor.

According to Armah et al (2016), bad access roads do not allow for direct travel from Sheini to Tamale.

Travelers have had to pass through Zabzugu, a rather farther route. A railway line will therefore shorten travel time from Sheini to Tamale.

Ghana would also become an important transit point for the landlocked neighboring countries such as Burkina Faso who can transport their goods and services to and from Ghana's ports through the rail line. The railway will thus generate new sources of revenue to the government.

Rehabilitation and extension of railway lines falls directly within Ghana's Railway Master Plan (RMP), which has the following main components:

- a. Rehabilitation, improvement and modernization of the existing railway infrastructure;
- b. Expansion of railway infrastructure to other parts of the country and linking with neighboring countries such as the Ivory Coast, Togo and Burkina Faso; and
- c. Interconnection of railway infrastructure with other modes of transportation (intermodalism).

Picture 4: Railway Line Extensions in the Master Plan



Source: Ghana Railway Infrastructure Authority, 2013

Figure 10 above shows existing (black lines) and proposed extensions (red lines) of railway network throughout the country. Yendi is about 2 hours' drive from Sheini. It is within the plans of the Ghana Railway Development Authority to reconstruct the Western Line, Eastern Line and Central Lines into double tracks. The Western Line which connects from Accra to Kumasi will be extended to Yendi through Tamale. The implication is that iron ore, once mined, can be transported by road from Sheini to Yendi (approximately 2 hours' drive) to be transported by rail to Accra. Once in Accra, the ore can be transported to the Tema Port by road.

It is also worthy of mention that the current government is keen on investing more income into infrastructure, particularly railway network. This option is therefore very likely to receive government's support and funding to materialize.

4.2.2.2 Option Two: Construction of a new and direct railway line from Sheini to the Ports

As seen from figure 10, there are plans to construct new railway lines that link Tema to Yendi through Akosombo, Ho and other towns on the Eastern

Corridor. The implication is that iron ore may have to be transported by road to Yendi, and by railway from Yendi to the harbor in Tema.

This option may be cost-effective as it allows for simpler and faster transportation. Like option one, it may receive government's support in terms of policies and funding. However, it limits the extent of economic spillover effect considering that the railway route would pass through fewer towns and villages compared to option one.

4.2.2.3 Option Three: Construction of a new railway line from project site to Togo

Option three is to construct a rail line from the project site to Blita in Togo (some 100km apart) where other minerals including limestone and phosphate are often transported (Cadero, 2013). Although it may be relatively cheap in the short term, this option will be expensive in the long run. Using Togo as point of transit would mean paying revenues to the Togolese Government. Issues of Regional Integration could be advanced in favor of this third option. However, in recent times of increasing terrorist activities on the continent, the issue of security becomes paramount. If Ghana

decides to use Togo as a transit point, then the security of the iron ore would, to a large extent, lay in the hands of the Togolese. Moreover, this option may not receive the support of the government of Ghana because it does not correspond with the national railway plan.

A railway transport option is nevertheless fraught with a number of challenges, including noise pollution; but key is the issue of displacement. The main issue with the rail system is the payment of fair and adequate compensation and/or resettlement of persons who would be adversely affected by the project through demolishing, clearing of fertile farmlands and general restriction of their social and economic rights. It is important that adequate, fair and timely compensation be done in consultation with all relevant stakeholders when the issue of

displacement arises.

4.2.3 Overland and Lake Combination

This option involves two rail/truck transportation: Sheini to Katare and Akosombo to Tema, interspersed by water transport between Katare to Akosombo.

There is an inherent risk in having to offload and load at Katare and Akosombo. This would mean developing terminals at Katare and Akosombo to facilitate this process. Besides that this option may be expensive, and water levels in Lake Volta and River Oti must constantly be high to facilitate the transport of the ore. High water levels can however not be guaranteed at a time Ghana is faced with the realities of the effects of global warming and climate change.

4.3 Conclusion

Transport infrastructure in Sheini will not be as expensive as Simandou because it covers shorter distance and does not involve building new ports. In as much as slurry pipes would reduce the cost

involved, they will only serve the mines. The railway infrastructure, via options one and two, on the other hand would in addition to serving the mines, serve the socio-economic interest of the country

better by opening up markets between northern and southern Ghana. It can also be income-generating if extended to serve land-locked neighboring countries such as Burkina Faso. Moreover, slurry pipes may be redundant long after decommissioning of the mine but a railway will continue to serve communities and the local economy. A railway infrastructure may however require vast displacement of locals. It is important that adequate, fair and timely compensation be done in consultation with all relevant stakeholders when the issue of displacement arises.

CONCLUSION, SUMMARY OF KEY FINDINGS AND RECOMMENDATIONS

In the fiscal benchmarking study, Ghana's fiscal provisions in Act 703 were analyzed within the same geological and investment context as the fiscal provisions of the Simandou contract to assess the extent of the competitiveness and fiscal contribution to the government of the Sheini iron ore project. The transport infrastructure needs of the Sheini project were also assessed, and various infrastructure options were analyzed to inform a choice that is cheaper, better, and faster.

Under different price scenarios, Sheini promises higher government take than Simandou but Simandou promises higher returns to the investor than Sheini. Also, among the transport infrastructure options available to the investor, a railway infrastructure was seen to be the most desirable. Specific findings and recommendations to the study have been provided below.

5.1 Summary of Key Findings

5.1.1 From Government Perspective

1. Ghana's fiscal environment is better than Guinea's Simandou contract fiscal provisions. The analyses show higher government take in both discounted and undiscounted terms from Ghana's Sheini iron ore project than the Simandou project. The former project therefore makes higher fiscal contribution to

the Republic of Ghana than the latter does to the Republic of Guinea.

2. Ghana's current mining fiscal regime – the royalty system – provides an opportunity for the government to capture more rent in real terms from its mining 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 Sheini iron ore mine relative to the undiscounted take. Guinea's Simandou royalty system also provides similar early revenues to the Guinean government but at a lower rate.

3. The variability in government take between Shieni and Simandou can be explained by the generous fiscal terms that the Guinean government offers to the investors.
4. The fiscal terms of both Ghana's Minerals and Mining Act and that of the Simandou contract remain regressive. When price rises, investor profitability increases but government take declines. Due to absence of resource rent tax, both governments are unable to optimally capture value from the economic rent that investors enjoy during boom period.

5.1.2 From Investor Perspective

1. The competitiveness of the environment for investment in Ghana's mining sector is lower than Guinea on account of its lower project and investor profitability given the circumstances of the Sheini project. However, both the Simandou and Sheini iron ore projects

show long term viability as demonstrated by their positive NPVs.

2. Any fiscal provision that purports to relieve the investor of some of his tax burdens will improve his profitability. Higher profitability of the Simandou project is as a result of the generous fiscal terms that the Guinean Government granted to Simfer S.A. (the Simandou partners) to incentivize the investors to develop the mine and the local economy. Ghana also offers some investment incentives such as the expanded leverage in the thin capitalization rule of a debt-equity ratio of 3:1 provided for in the new Income Tax Act 2015 (Act 896). This promotes debt financing, and provides more tax savings to investors.

5.1.3 Infrastructure requirements

1. The infrastructure requirement and cost for the Sheini project is not as huge as that of Guinea. Unlike the Simandou project in Guinea, Ghana already has two functioning harbors in Takoradi and Tema which are about 400 kilometers south of Sheini. However, existing road and railway infrastructure to transport iron ore are inadequate to link Sheini

to the harbors in the South.

2. To invest in slurry pipes will be cost effective but only serve the mines. Upon decommissioning, slurry pipes may be redundant, provide little or no socio-economic benefits, and pose environmental challenges to the country. On the other hand, in addition to serving the mines, the railway infrastructure would serve

the socio-economic interest of the country during and long after decommissioning of the mine project as it will widen trade interactions between northern and southern Ghana. It can also be income-generating if extended to serve land-locked neighboring countries such as Burkina Faso.

5.2 Recommendations

1. Introduce a competitive bidding process for the award of mining contracts
To this day, mining concessions are awarded on a first come first serve basis. The process depends on the discretionary powers of authorities and are considered the pathway to rent-seeking and corruption (ACEP, 2016). The process also yields itself to the risk of granting generous terms that may result in sub-optimal outcomes. In the absence of open and competitive bidding process that ensures efficiency and transparency, Ghana risks losing significant revenues from the Sheini iron ore project whose development contract is yet

to be awarded. The mining laws should be revised to make the open and competitive bidding process a compulsory procedure to select the best candidate, maximize revenues and minimize the risk of moral hazard among agents of the state.

2. Introduce flexibility into the fiscal regime
Fiscal terms, through progressive taxes, must be flexible enough to ensure fairness and balance the interest of both the investor and the government. Flexibility allows government to capture the benefits of changes in future market and political conditions without changing the fiscal regime. 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 (ACEP, 2016).

3. Build the modelling capacity of government institutions

In the short-to-medium term, 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 mining agreements must be properly evaluated through the use of purpose-built models. The capacity of state institutions such as the Ministry of Mines and Natural Resources, the Ghana Revenue Authority and Parliament must be built to enhance their modelling competencies and negotiation skills (ACEP, 2016).

4. 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 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 mining 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 (ACEP, 2016).

5. Invest in Railway Infrastructure

An investment in railway infrastructure that connects Sheini with the harbors in the South fits within Ghana's development plan because it provides long-term opportunity to close the communication gap between local economies in northern and Southern Ghana. Public Private Partnership is an optimal strategy for railway infrastructure development as it will

balance Ghana's development plan with the investor's likely preferred option to build and operate a cost-effective slurry pipeline. To incentivize the investor to finance the railway infrastructure, the government of Ghana may make budgetary commitments to this project by complementing investor expenses on transport infrastructure with petroleum revenues allocated to the Annual Budget Funding Amount (ABFA) for capital projects in accordance with the provisions of the Petroleum Revenue Management Act (PRMA).

APPENDICES

Appendix 1: Computation of Operating Cost

Equation 1

$$\text{Profit} = \text{Total Revenue (TR)} - \text{Total Cost (TC)}$$

Where

a. Equation 2

$$\text{TR} = \text{Average Price (\$51.32)} * \text{Quantity (100 million tonnes/annum} \\ * 25 \text{ years)}$$

$$\text{TR} = \$51.32 * 2.5 \text{ billion tonnes}$$

$$\text{TR} = \$128.3 \text{ billion}$$

b. Equation 3

$$\text{TC} = \text{Capital Expenditure (Capex)} + \text{Operating Expenditure} \\ \text{(Opex)}$$

$$\text{TC} = 18 \text{ billion} + \text{Opex} * 25$$

c. Equation 4 (Profit can also be expressed as follows)

$$\text{Profit} = \text{Rate of Return (RoR)} * \text{TR}$$

$$\text{Profit} = 0.12 * \$128.3 \text{ billion}$$

d. Equation 5 (Merge Equation 1 and Equation 4 by substitution)

$$0.12 * \$128.3 \text{ billion} = \$128.3 \text{ billion} - (18 \text{ billion} + 25 \text{Opex})$$

$$\$15.39 \text{ billion} = \$128.3 \text{ billion} - 18 \text{ billion} - 25 \text{Opex}$$

$$\$15.39 \text{ billion} = \$110.3 \text{ billion} - 25 \text{Opex}$$

$$25 \text{Opex} = \$110.3 \text{ billion} - \$15.39 \text{ billion}$$

$$25 \text{Opex} = \$94.91 \text{ billion}$$

$$\text{Opex} = \$94.91 \text{ billion} \div 25$$

Opex (for 25 years)	=	\$3.7964 billion
Opex per annum	=	\$3.7964 billion ÷ 25
Opex per annum	=	\$151.856 million
Opex per unit ton	=	\$151.856 million ÷ 100 million tonnes
Opex per unit ton	=	\$1.52 million

Appendix 2: Computation of NPV of Differential Royalty Rates and Time of Payment

Gross mineral revenue for the first year (2019)	=	\$51.32 * 100,000,000
	=	\$5,132,000,000
3.5% tax on gross mineral revenue	=	0.035 * \$5,132,000,000
	=	\$179,620,000
NPV of \$179,620,000 at 12% discount rate for 3 years	=	\$179,620,000 * (1.12) ⁻³
	=	\$179,620,000 * (0.7118)
	=	\$127,853,516

Therefore, the present worth of 3.5% tax on gross mineral revenue from 2019 is \$127,853,516

Assuming that annual production is constant at 100,000,000 dmt over the project's lifespan, the present worth of \$179,620,000 at 12% discount rate for 24 years (from 2040)

$$\begin{aligned}
 &= \$179,620,000 * (1.12)^{-24} \\
 &= \$179,620,000 * (0.0659) \\
 &= \$11,836,958
 \end{aligned}$$

Therefore, the present worth of 3.5% tax on gross mineral revenue from 2040 is \$11,836,958

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The following resources aided the fiscal benchmarking exercise:

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