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Carbon Fiscal Instruments and Green Finance: An Aid to the Success of SDGs in Nigeria?

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Abstract

The need to improve on the use of Fiscal Instruments and engender an improvement in Green Finance remains a challenge in Nigeria. Using the Metcalf's Framework, this paper explains why Carbon Fiscal Instruments are enforced on emitters to check emissions and their level of effectiveness. Furthermore, a comparative analysis of Nigeria's performance with some sub-Saharan African countries using the SDGs Index and Dashboard Indicators Framework was discussed. Finally, after appraising the use of Green Finance as a means of innovative finance, the paper found a dearth of fiscal instruments in Nigeria coupled with a low level of Green Finance opportunities. The paper concludes that Nigeria needs to design and implement an optimal climate change fiscal policy and Green Finance mix for Green growth. We recommend that the government needs to encourage creative and innovative ways of generating funds for Green investments in the private sector.

Keywords: Carbon fiscal instruments; green finance; SDGs

Introduction

Due to the discussion initiated by the Intergovernmental Panel on Climate Change (IPCC) and the Stern Review, on the urgency to cut back carbon emissions (Andrew, 2008), scholars raised the query of whether developing countries ought to follow the 'grow now, clean-up later' path that developed and industrialised countries took (Van Alstine and Neumayer, 2010). Theoretically, this question was raised because it is assumed that developing countries -unlike developed countries- are less concerned about the environment and more concerned about consumption (Hallegatte *et al.*, 2011). As basic needs are met, the incomes of developing countries start to increase; the portion of income paid as tax to government also increases (Everett *et al.*, 2010). And so, they begin to place a higher value on environmental quality as they become rich (Hallegatte *et al.*, 2011). This has made the government of developed countries to expend more on clean-up and environmental protection (Everett *et al.* 2010).

The argument emphasised that the path (grow now, clean-up later) is not tenable on the grounds that it is frugal to abate pollution at early stages of development than to spend higher clean-up costs at the later stage. This is as a result of the fact that some infrastructures are long-lasting and may be hard to change their form in the future (World Bank, 2012). Unlike the green economy, the 'grow now, clean-up later' path does not consider the role of environmental irreversibility. Under the path, if parts of the Okomu Forest Reserve in Edo State Nigeria are cleared for the purpose of agriculture, the forest can be restored by replanting but it is impossible to bring back to life the biodiversity potential of the Forest. The climate is affected, as well, because the emitted CO₂ from the destruction of the Forest is retained in the atmosphere for decades. Thus, the long-delayed action to clean-up is dangerous (World Bank, 2012).

In order to resolve the flaws of the 'grow now, clean-up later', it is suggested to developing countries to pursue clean growth by minimising pollution (World Bank, 2012). Climate change policies, (also referred to as carbon fiscal instruments in this study) are fiscal policies that support low-carbon developments at lower costs in the long run. These climate change policies are fiscal policies as identified in the Intergovernmental Panel on Climate Change (IPCC) reports, Stern Review and the Global Green New Deal (GGND). In pursuance of the internationally accepted grow clean policy, which is intended for adoption, Nigeria (in its Intended Nationally Determined Contribution (INDC)) aimed to reduce its carbon dioxide

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equivalent (CO₂e) per US\$ real GDP (i.e. carbon intensity) – from 0.873 kg CO₂e in 2015 to 0.491 kg CO₂e by 2030 (Federal Government of Nigeria -FGN, 2015).

With the aim of complimenting carbon fiscal instruments in reducing carbon developments, Green Finance is also a veritable source of providing financial support for the attainment of the Sustainable Development Goals (SDGs) in Nigeria. Green Finance can be described as the funding provided to finance projects that lead to the attainment of a low carbon economy. The promotion and development of green industry, reduction of pollution discharged to the atmosphere and funding of renewable energy are some of the projects that can be aided through green finance along-side with carbon fiscal instruments (UNDP, 2018).

The reduction in CO₂e intensity might be achieved by: ending gas flaring, enforcing and improving energy efficiency of the electricity grid, adopting off-the-grid solar power generation, adopting climate-smart agriculture and reforestation, as well as transport shift from cars to bus rapid transit (BRT), all by 2030 (FGN, 2015). Although 2030 from now seem like a long and enough time to convert the INDC plans into actions, major constraints like lack of financial influence, public support, etc. can make the plans not to be fully attainable (Akanonu, 2017). Hence, there is the need to assess how Nigeria's fiscal instruments are used to support the attainment of Nigeria's INDC commitments. These instruments would be "killing two birds with a stone" as it would support the realisation of the sustainable development goals (SDGs) on climate action (SDG 13), affordable and clean energy (SDG 7), and industry, innovation and infrastructure (SDG 9) because they all fall under the grow clean policy.

The climate change economic instruments can be categorised into non-market and market-based instruments (Fisher *et al.*, 2013). In terms of economic efficiency and reduced administrative cost, the two instruments are not concurrently needed in an economy with a perfectly functioning market (Gupta *et al.*, 2007). Only market-based instruments are needed to control the negative externality. Put differently, market economies adopt market-based instruments because of their theoretical advantages like cost-effectiveness (Stavins, 1998). Nevertheless, in practice, the market-based instruments are hindered by barriers (Holland, 2009): such as market failures (for example, information unevenness about Nigeria's green sector) and negative distributional effects (for example, poor households are affected more under market-based instruments because the substitution of a gas stove for kerosene stove is pricey). These barriers provide the justification that the mix of non-market-based and market-based instruments are practically necessary as the non-market-based instruments help to contract the barriers of market-based instruments to ensure distributional equity.

Based on the above explanation, this paper discusses the carbon-related fiscal instruments adopted and adoptable in Nigeria as climate change policies.³ Secondly, it determines whether the country is in the process of realising the above-mentioned SDGs and finally the paper contributes to the literature by considering the role of green finance⁴ and government spending to support climate change mitigation projects in Nigeria. The rest of the paper is divided into six sections. Section two of the paper reviews the literature. Section three presents the methodology; section four is on the discussion of funding options of carbon fiscal instruments in Nigeria. Section five appraises the achievement of SDG 7, 9 and 13 while sections six discusses the supplementary funding efforts through green finance and section seven concludes the paper.

Literature Review

Non-market-based instruments

Non-market-based instruments (also called conventional regulatory instruments) are standards used to regulate firms' and individuals' activities so as to bring down their level of emissions. These standards are applied in areas such as fuel use by motor vehicles, energy efficiency, pesticides used for agriculture, etc. Standards may be compulsory and set as targets or voluntary (Grubb, 1991; Fisher *et al.*, 2013). The mandatory standards could be technology-based or performance-based (Fisher *et al.*, 2013). The technology-based standards are popular for putting vehicular carbon emissions under check in developed countries (Hogarth *et al.*, 2015). Performance-based standards are more flexible. It is adopted to give firms maximum allowable levels of CO₂ emissions from combustion in European Union (Andrew, 2008). The United States Climate Change Action Plan of 1993 is an example of a Voluntary standard initiative that

³ Carbon is a generic term used for greenhouse gases (GHG). The "grow clean" policy is a term used interchangeably with green growth in this paper.

⁴ Green Finance is funds from public or private sources invested into low carbon developmental projects (also called green investment) and or carbon fiscal policies (also called climate change policies) which could be for climate change adaptation and mitigation, waste processing and recycling, water sanitation, and biodiversity protection. For this study, it is used to refer to carbon and climate finance (Lindenberg, 2014).

was targeted at ensuring energy efficiency (Fisher et al., 2013). Even though non-market-based instruments are theoretically disposed to be less effective than market-based instruments, there are situations where and when they are right for use, for example, if Nigeria wants an immediate compliance for cleaner growth (Everett et al., 2010).

Market-based instruments

Market-based instruments are fiscal instruments enforced on carbon emitters as cost incentives to abate emissions (Bräuninger *et al.*, 2011). These incentives are to prompt firms to adopt clean production techniques that support green growth. Due to their flexibility in delivering results, market-based instruments are cheaper than the conventional regulatory instruments (European Commission, 2005). A range of market-based tools can be adopted by the Nigerian government to promote clean growth and transit to a green economy. This study adopts the market-based instruments as a basis for assessing the carbon fiscal instruments currently in use and those that can be introduced to enhance environmental Fiscal Reform in Nigeria.

Insights from Empirical Studies

Empirical studies have been conducted on the opportunities and challenges of green finance from the private sector and carbon fiscal instruments from public sector, which could be from a national government or multilateral organisations. Kosonen and Nicodème (2009) found carbon-related fiscal instruments to be cost-effective means of achieving environmental goals in the European Union. This is empirically supported by Franks, Edenhofer, and Lessmann (2014) that carbon-related fiscal instruments (especially carbon tax) is a viable green policy that postpones extraction of carbon-related resources and reduces emissions.

The International Monetary Fund (IMF) (2011) claims that carbon-related fiscal instruments are critical to climate change mitigation. They should therefore be earmarked as green finance for green investments in a developing country. Buchner, Heller and Wilkinson (2012) observed how effective green financing from public funds had altered green finance from private entities, financial institutions, and capital markets to invest on climate change mitigation projects. Even though public funds spent on green investments are consistent with low carbon development, more actions are needed to enable private sector green investors to overcome perceived risks by the private entities, financial institutions, and capital markets.

Pegels (2016), also, looked at green finance from the public sector by paying attention to carbon tax designs in developing countries. It identified that carbon (and energy) tax reduces incentives that firms have to remain in the informal sector. It affirms that these carbon-related fiscal instruments have neutral or positive effects on market competitiveness and gross domestic product. Falcone and Sica (2019) explored the challenges and opportunities of obtaining green finance to support Italian biomass production. Although green finance was found to achieve sustainable innovation pathways, Italian biomass producers face institutional and financial bottlenecks at funding their green investments. To leverage green finance from the private sector, Pigato *et al.* (2018) reports that there is a more than two decades' research that supports that developing countries can rely on fiscal instruments as a source of green finance to mitigate climate change. Findings from these studies points to a need for an improved innovative means of generating funding for green investments in developing nations especially a populous nation like Nigeria.

Research Method

The use of carbon fiscal instruments by countries to mitigate carbon emissions and foster green growth are on the rise. As such, Metcalf (2015) identified the need to take a stock of the carbon fiscal instruments adopted and assess the strengths and weaknesses of the reforms. The Metcalf (2015) Framework for Assessing Environmental Fiscal Reforms is adopted in this study due to its classicality to ensure any form of pollution (or waste) reduction, which resides in 5 key elements. They are environmental improvement, fiscal solvency, efficiency, fairness, and the ease of administration and compliance. These elements are used to form the following questions.

Are there subsidies to the production or consumption of energy and/or natural resources? This question is interpreted to basically mean that a high proportion of subsidy payments from tax revenue in the case of fossil fuels supports an increase in carbon emissions and so indicates the need for an improved fiscal position. The environmental benefits that would be gained given the reduction of fossil fuel combustion include decrease in greenhouse gas emissions, reduction of road congestion and vehicle mileage, and reduction of number of accidents. Meanwhile, a high subsidy to tax revenue or GDP is

considered favourable, provided such tax is channelled towards the funding of renewable energies. This type of subsidy is considered as green finance.

Do market prices reflect the social costs of production or consumption considering pollution generating activities? This question attempts to expose the efforts of governments of developing countries engagement in climate change mitigation actions under the United Nations Framework Convention on Climate Change (UNFCCC), especially, the application of carbon tax and/or carbon price due to emissions trading as a source of green finance.

What are the efficiency and distributional implications of any proposed environmental fiscal reforms? Due to the multiplicity of fiscal reforms and distributional intimation by different country's needs, the paper restricts to the case of Nigeria by discussing different environmental carbon fiscal policy instruments and or reform mix that can be used to reduce carbon emission.

Should fiscal reforms be revenue neutral? If so, should revenue neutrality be assessed on an ex ante or an ex post basis? The environmental fiscal reform could be the type that raises additional revenue or it could be the type that is revenue neutral. A country with a chronic budget deficit (like Nigeria) might find a revenue-oriented green fiscal reform attractive but a revenue neutral green fiscal reform unattractive because –unlike revenue-oriented green fiscal reform- it has only the ability to increase the nation's level of carbon sink without increasing green finance.

What are the relevant administrative, compliance, and enforcement issues that should be addressed with the reform? This deals with the administration, compliance, and enforcement of carbon fiscal policy and/or reform.

Result and Discussion

As the world progresses from the “action by a few to action by all” by European Commission, carbon fiscal instruments are becoming popular as cost incentives for emissions abatement in Nigeria (Bräuninger et al., 2011). Therefore, in assessing the viability of the use of carbon fiscal instruments in Nigeria, this section employs Metcalf (2015) Framework in line with the research questions raised in the previous section.

Subsidies to the production or consumption of energy and/or natural resources

Although subsidy can be used to induce proactive investments for climate change mitigation, fossil fuel subsidy (FFS) is identified as an inefficient instrument that becomes rent seeking (Porter, 1990). FFS allows an inefficient allocation and utilisation of natural resources (United Nations Environment Programme -UNEP, 2015). Hence, after decades, the removal of petrol subsidy in Nigeria became an issue of importance. This is an issue for all sub-Saharan African (SSA) countries. Fuel subsidy in 2013 alone was estimated by the IEA to be \$6.6 billion in Nigeria, which was around 1.3% of Nigeria's GDP (Hogarth et al., 2015).

This is more than twice and more than five times of Nigeria's education expenditure to GDP (0.48%) and health expenditure to GDP (0.22%). According to the African Development Report (ADR) (2012), this high volume of government spending poses a high burden on government budgets. The provision of FFS in Nigeria benefitted mostly the high-income earners than low-income earners, and this has a negative economic, social and environmental impact that enables consumers to pay less to use more quantity of fossil fuels hence increasing CO₂ emissions.

The removal of FFS integrates environmental impacts into prices so that costs can be equitably distributed across economic units (rich or poor) to promote both sustainable and inclusive growth. As such, FFS reform can reduce the usage of polluting energy sources and at the same time improve the Federal Government's fiscal balance (UNEP, 2015). Like the success stories of FFS reform from Ghana (since 2005) and Senegal (since 2009) (Global Subsidy Initiative (GSI), 2010), Nigeria started its subsidy reform for climate change policy since 2008 in the electricity sector while that of fuel subsidy started since 2011 but only a reduction (and not an elimination) of the FFS was achieved in January 2012 (Hogarth et al., 2015). At this time, fuel subsidy amounted to 19% of the Federal Government's budget in 2011.

Like Angola, Ghana, Senegal and Uganda, Nigeria claimed to have completed its elimination of petrol subsidy years after it adopted the FFS reform –i.e. in January 2016 (Beedell, 2017). However, the country paid ₦261.4 billion as fuel subsidy as at December 2017 and the Minister of State for Petroleum Resources claims that the value for fuel subsidy in 2018 rose by 386% (Kachikwu, 2018). The provision of subsidy by the Federal Government of Nigeria before the FFS reform affects fiscal balance and this may be one of the major contributors to fiscal deficits apart from the environmental impact of high consumption of motor spirits occasioned by government subsidy.

Market prices to reflect the social costs of production or consumption of energy that generates pollution

Back to the status quo, the market price of fuel pump only reflected the international oil price in 2016; it does not reflect international oil prices in 2017 and 2018 in Nigeria. This is due to the fossil fuel subsidy. Furthermore, there is the absence of market prices that reflect social costs of carbon pollution activities from production or consumption by not including carbon pricing reform. In Nigeria, the recommended carbon pricing (reform), which takes care of the market failure that externalise the cost of carbon emissions into the atmosphere (Stern, 2006) has not been adopted. In consideration of this gap, carbon pricing reform can be introduced by enforcing taxes on carbon emissions (carbon tax) or a trading scheme (carbon market) (Hepburn and Stern, 2008). The effect of ensuring that market prices reflects social costs, i.e. an economy internalise the social cost of emissions, is an increase in market prices which may lead to a shift in consumption in favour of more sustainable substitute products, for example an increase in market prices of fossil fuels may encourage a switch from the use of diesel to generate energy to the use of solar panels. This is empirically proven by Pegel (2016).

They both differ in theory and in design, but they both achieve a similar efficiency level of abatement at a minimum cost (Kasterine and Vanzetti, 2010). Due to expensive transaction cost, market imperfections (like collapsing carbon credit prices) and uncertainty, developing countries like SSA may find a trading scheme undesirable and the carbon tax desirable for domestic mitigation efforts (Stavins, 1998). Introducing carbon tax in Nigeria is not an aberration because the carbon tax is supported by the International Monetary Fund (IMF, 2008) as an additional means of government revenue that can be used to leverage private finance for clean technology investments. Also, the carbon tax yields higher price stability and flexibility when there are changes in economic activity (Kasterine and Vanzetti, 2010). For these reasons, losses in welfare are lower under the carbon tax than under the trading system (Goulder and Pizer, 2006). Since the world's first introduced carbon tax in 1990 in Finland, only a few SSA countries levy or is preparing to levy the carbon tax.⁵ Carbon tax would ensure that market prices reflect social costs of carbon pollution activities from production or consumption. This has been empirically confirmed by Pegels (2016) that carbon tax has a contributory effect to market competitiveness and GDP. However, implementing carbon tax in Nigeria must be done to suit the economy's tax administrative capacity and socially inclusive green investments.

Efforts on environmental fiscal reforms in Nigeria

A wide variety of reforms has been made in Nigeria relating to oil, tax, and land reform on climate change over time but the efficiency and distribution across various sectors, which enhances fiscal benefits in terms of income, has not been fully tapped. Alongside carbon tax, Nigeria lacks the enforcement of energy tax to reduce emissions from energy use. However, this is compensated for by the enforcement of value-added tax (VAT) on electricity consumption, petroleum profit tax (PPT) on crude oil production and the about to be passed petrol tax on petrol consumption.

Tax on electricity in the form of VAT on electricity consumed (and petrol tax), like the carbon tax, is imposed to reduce the free rider problem on emitting CO₂ in Nigeria (IMF, 2011). They are to reduce energy use by either decreasing energy consumed or enhancing efficiency by using energy saving technologies and opting for renewable technologies like solar (Bräuninger et al., 2011). This supports IMF (2011) that such levy raises significant revenue for a country but may not significantly reduce emissions like carbon tax. In addition to electricity tax, countries like Kenya levies fuel tax (University of Nairobi Enterprises and Services LTD, 2016), South Africa collects billions of rand as revenue from fuel levy and emissions tax on new passenger motor vehicles (Green Growth Best Practices (GGBP), 2014) that are used to generate energy (SDG 7) and build industry, innovation and infrastructure (SDG 9).

The use of land tax in countries like Eritrea, Ethiopia, Namibia, (some States in) Nigeria and South Africa is identified to assist in the provision of public services like education, health and public safety. Land use tax is paid either for land ownership or use and it impacts on deforestation which determines the level of carbon sink. Land use tax on land used for purposes of carbon sink and ecosystem preservation are expected to be low, otherwise, they are to be high (Bräuninger et al., 2011).

Countries' CO₂ emissions from land use, land use change and deforestation are the largest sources of emissions in SSA (World Bank, 2013). Hence, a more general adoption of land use tax in Nigeria - and not in just a few States- to reduce CO₂ emissions from land use, land use change and deforestation are

⁵ Zimbabwe had since 2001 introduced carbon tax on vehicles (Nhamo and Inyang, 2011) while Zambia (since 2010) levies a carbon emission tax only on vehicles that are older than five years (www.globalfueleconomy.org). South Africa is still preparing to introduce the carbon tax (www.m.engineeringnews.co.za), so also are Ethiopia (IMF, 2016) and Mauritius (Dalmazzone, 2015).

required. As stated in the Associated Gas Reinjection Act of 1979, the use of environmental tax has, since 1984, been one of the frontline policies to eliminate gas flaring in Nigeria (Akinwande, 2014). This is in the form of the penalty paid per a thousand standard cubic feet (scf) of gas flared. The penalty has been raised from a decade to the other. However, the paltry rate of reduction in gas flaring in Nigeria since the implementation of the penalty raises the question of whether the environmental tax is effectively enforced and does it significantly discourage pollution in Nigeria (Ibid.)?

Revenue-neutral and revenue-based fiscal reforms

Nigeria has applied revenue decreasing and increasing green fiscal reforms. Aside from those discussed in the previous section, there are other revenue-based environmental fiscal reforms that the country can adopt and implement. The fee-bate can be adopted as a substitute to the carbon tax (IMF, 2011). A fee-bate in the power sector, for illustration, can be imposed on reasonably dirty generators while moderately clean generators would get a rebate (Parry and Krupnick, 2011). Probably the first to adopt fee-bate among developing countries, Mauritius enforced a fee-bate scheme to incentivise fuel-efficient vehicles in 2011 (Akumu, 2012). The fee-bate was, however, abolished in 2016 to introduce a carbon tax system with additional incentives for the importation of electric vehicles (Akumu, 2016). Zambia levies a carbon emission tax on vehicle engine capacity on vehicles that are older than five years (GFEI 2017). The fee-bate for fuel efficient vehicle policy, as it is under adoption in Uganda, should be adopted in Nigeria for vehicles with obnoxious toxic fumes.

Although Nigeria is running a budget deficit, there are revenue neutral fiscal policies that can be adopted to support effective enforcement of environmental policies, especially to maintain or increase the carbon sink capacity of the country. These include the Payment for Ecosystem Services (PES), Habitat Banking, and technology-based standard.

In order to support the conservation of forest and avoid deforestation, the PES should be adopted in Nigeria as it was in the Eastern Arc Mountains and the Mau Forest complex of Kenya (Bräuninger et al., 2011; UNEP, 2012); is being used to expand farmland to 85% in Rwanda by 2020 (Dyszynski, 2011); and is applied to reduce CO₂ emissions from deforestation and forest degradation by supporting Community Carbon Cooperative development in Tanzania (GGBP, 2014). The PES is a regulation and an incentive offered to landowners or ecosystem stewards to manage the land to support ecological and environmental services.

Like other SSA countries that are adopting the PES, Nigeria may need the support of international organisations like the Global Environmental Facility's (GEF), reducing emissions from deforestation and forest degradation (REDD+), the World Wildlife Fund (WWF), among others (Kalunda, 2016). The PES can also be used to foster Intergovernmental contracts in SSA. The PES contract between Lesotho and South Africa can be drawn on to illustrate this whereby Lesotho provides water from the Senqu River System to the water-stressed Gauteng region in South Africa to power the underground hydropower station of Muela Power Station. The Power Station, in turn, generates clean energy for both Lesotho and South Africa (Kalunda, 2016).⁶

Unlike the PES, the use of Habitat Banking in SSA is inadequate (UNCTAD, 2012). Habitat Banking is necessary for SSA (Nigeria inclusive) because it aims at conserving ecosystem services of land and biodiversity by strictly adhering to the polluter-pays principle. The companies or parties that reduce ecosystem services in one location (i.e. polluter) pay damages by financing habitat projects on another location or the same location (Bräuninger et al., 2011). This entails private sector partnership while the government is just the mediator. South Africa is the only known SSA country that has been applying Habitat Banking to conserve its land and biodiversity whereby South African mining companies are mandated to set up a fund to cover the closure outlay at the end of its economic life and replace the mine sites with fish pond projects or mushroom plantation (UNECA, 2012).⁷ This can be applied to crude oil production companies in Nigeria. Close to the use of Habitat Banking is the tax incentive to grow trees. Although Nigeria (like Ghana and Kenya) charges tax on timber products –also called logging tax (UNEP, 2015), it should be ploughed back into reforestation and afforestation activities as it is done in Kenya (GGBP, 2014).

The use of the technology-based standard is good for Nigeria; however, the country has little control over the design of technologies used in the country. This, for illustration, makes the use of technology-based standards like the plug-in hybrid electric vehicles (PHEVs) a mere prospect. However, the country

⁶ The Lesotho-South Africa PES contract contributes to SDG 6 of clean water and sanitation, SDG 7 of affordable and clean energy and SDG 13 of climate action (i.e. reducing energy related emissions).

⁷ De Beers' Kimberly project uses underground mine tunnels to grow mushrooms (UNECA, 2012).

has in place technology-based standards like regulating the efficiency and age of imported used vehicles. This policy also exists in SSA countries like Angola, Botswana and Kenya (Hogarth et al., 2015).

The administration, compliance, and enforcement of carbon-related fiscal policy

The Federal Inland Revenue Service (FIRS) is in charge of the administration, compliance and enforcement of the PPT and VAT on electricity consumed in Nigeria. The State Inland Revenue Service (SIRS) is charged with the administration, compliance and enforcement of land use tax and logging tax in Nigeria. The Department of Petroleum Resources (DPR) is charged with the administration, compliance and enforcement of the penalty on gas flaring.

Inadequate accountability, weak administration and rogue enforcement of these fiscal policies on the part of these tax administrators and inappropriate utilisation of the tax proceeds on the part of government have been a major issue detrimental to tax compliance in Nigeria. The failure of the DPR to enforce the penalty of an expected value of \$3.9 billion on gas flaring by oil companies between August 2011 and November 2012 serves as an illustration (Akinwande, 2014). The Nigerian Extractive Industries Transparency Initiative (NEITI, 2006) observed that the DPR was weak in carrying out its function of monitoring the volume of gas produced before gas flaring in the oil and gas sector. This affects the accuracy and reliability of the data provided by the Department to the Petroleum and International Tax Department (PITD) of the FIRS for calculating the PPT charged on the oil and gas companies. To buttress the inappropriate utilisation of the tax proceeds on the part of the government, the current finance minister on the British Broadcasting Corporation (BBC) commented that “corruption is the most debilitating factor in the Nigerian economy, next to wastage”. In 2015, Nigeria spent ₦64 billion on travelling while it spent just ₦19 billion on road construction projects (Oyedele, 2016). It suffices to say that the lack of accountability might have contributed to the declination of the government not to introduce and the people not to support additional fiscal instruments that could be used for low-carbon development.

Meanwhile, an instrument cannot effectively address the market failure of bearing the cost of carbon emissions, the adoption and implementation of additional fiscal instruments (mentioned in Section 4.4) are required to make up an economy’s climate change policy (Everett et al., 2010). Since carbon fiscal instruments may have distribution effect on wealth (Rentschler and Bazilian, 2017), policymakers need to consider the adoption and implementation of optimal policy mix of these instruments due to their pertinence in making the green investment that would support the attainment of SDG 7, 9, and 13 by or before 2030.

Achieving the SDG 7, 9, and 13

How to finance the SDGs is a focal concern to every country. The carbon fiscal instruments and green finance (from public and private sources) are tools available to governments to mobilise funds to fund SDG 13 (UNDP, 2018). They are also useful to fund SDG 7 and 9 because of their link to achieving SDG 13. Using funds mobilised through carbon fiscal instruments and green finance to fund green investments like distributing affordable and clean energy plant like solar panels to rural households would achieve not only SDG 7 but also SDG 13 (i.e. climate action to reduce carbon emissions from energy). Devoting funds mobilised through carbon fiscal instruments and green finance to invest in the production of green products that apply the recycle and reuse of resources, and low-carbon technologies would not only achieve SDG 9 (i.e. industry, innovation and infrastructure) but also achieve SDG 13 by reducing environmental waste.

Having assessed the carbon fiscal instruments being employed and suggestions for widening the scope of the instruments for carbon abatement in Nigeria in the previous section, this section presents a comparative analysis between Nigeria and selected SSA countries using the SDG Index and Dashboard Indicators Framework. This is to show the deficiency or otherwise of Nigeria’s condition and assert the need for Nigeria to adopt and implement an optimal climate change policy mix.

Access to electricity is the selected indicator for SDG 7 on Table 1. It shows that less than 60% of Nigeria’s population had access to electricity during 2013-2016. This indicates that Nigeria is far from the achievement of this goal. Getting above 80% (like South Africa and Gabon) would get Nigeria closer to achieving this objective while being above 98% (like Mauritius) guarantees the achievement of the goal.

Due to data deficiency, the study applied mobile cellular subscriptions (per 100 people), as to mobile broadband subscriptions, for SDG 9. From the rear, Nigeria ranks next to Kenya with 82.9 against 80.4 for Kenya. It is important to note that between the period from 2013 to 2016 all the countries listed on Table 1 under SDG 9 have been improving, except Nigeria that dropped in 2016 from 83.2 in 2015 to 82.9 by a margin of 0.3. This is an indication that attainment of the thematic theme as scheduled is a serious challenge for Nigeria.

Compared to other countries (except Kenya), Nigeria is far behind on industry, innovation and infrastructure. Looking at the state of energy-related CO₂ emissions per capita during 2013-2016, Nigeria

has an energy-related CO₂ emission that is less than 2MtCO₂ and it is decreasing; hence, it achieved the SDG 13 in the identified years. It is important to say that the predominance of the current coordination and implementation of fiscal instruments for climate change mitigation in Nigeria is essential and may have been adequate for the attainment of SDG 13. Meanwhile, the challenges facing the attainment of SDGs 7 and 9 calls for a more effective carbon fiscal reform and higher green finance with some other efforts in Nigeria.

Table 1. SDG 7, 9, and 13 Indicators

Access to Electricity (% of total population) – SDG 7									
Country	2016	2015	2014	2013	Country	2016	2015	2014	2013
Botswana ^o	60.69	58.53	56.37	54.21	Mauritius	98.78	98.74	98.70	98.66
Gabon	91.40	90.31	89.22	86.4	Nigeria ^o	59.30	52.50	56.37	55.60
Kenya ^o	56	41.6	36	31.55	South Africa	84.20	85.50	86.00	85.4
Mobile Cellular Subscriptions (per 100 people) – SDG 9									
Botswana	146.2	157.3	157.3	152.5	Mauritius	143.7	139.9	131.4	122.2
Gabon	149.6	146.2	156.4	151.1	Nigeria	82.9	83.2	78.7	74.1
Kenya	80.4	79.8	73.1	71.0	South Africa	147.1	159.2	145.4	142.9
Energy-related CO ₂ emissions rate per capita (metric tonnes of CO ₂ (MtCO ₂)) – SDG 13									
Botswana *	3.15	3.22	3.22	2.44	Mauritius *	3.38	3.30	3.36	3.24
Gabon *	2.77	2.74	2.76	2.89	Nigeria	0.56	0.55	0.53	0.56
Kenya	0.32	0.31	0.30	0.28	South Africa *	8.05	8.34	8.95	8.64

Note: The data are presented according to the SDG Index and Dashboard. ^oindicates less than 80% of the population has access to electricity. *indicates greater than 2 MtCO₂.

Source: World Development Indicator (2018)

Supplementary efforts through Green Finance for Nigeria

It was noted under the Intended Nationally Determined Contribution (INDC) that Nigeria needs about \$5.68 million per year (for a period of 25 years) for sustainable infrastructural development (Cervigni at all., 2013) The INDC shows the Nigerian government priorities to end gas flaring by 2030, enforce energy efficiency with 2% improvement per year and 30% by 2030 by adopting off-grid solar and improving energy efficiency of the electricity grid, adopt climate-smart agriculture and reforestation, and take on a transport shift from cars to buses (FGN, 2015).

Like other SSA countries (e.g. Ethiopia and South Africa) with the INDC, Nigeria's revenue faces the challenge of being insufficient to provide for the identified projects (Akanonu, 2017). The decline in crude oil revenue between 2014 and 2016 (CBN, 2016) further impeded the government's fiscal capacity to pursue the projects for sustainable infrastructural development (Akanonu, 2017). Meanwhile, Nigeria's budgetary support and domestic public funds are needed for the seed capital to finance green investments (GGBP, 2014). The Ministry of Environment, in partnership with the Ministry of Finance, however, is working on issuing a green bond that would attract investors for the low-carbon infrastructure development targets set in the INDC (African Economic Outlook, 2017).

In light of this, multilateral and bilateral sources are vital to fund green investments in the country (Nhamo, 2013). This is supported by the Article 3 of the UNFCCC that emphasises that the climate investment needs of developing countries, particularly the vulnerable Parties (SSA countries inclusive), should be given full consideration (United Nations, 1992). Tracked and traded under the three-international market-based mechanisms, carbon units traded under the Clean Development Mechanism (CDM) is the one that allows emissions removal projects in developing countries (Nigeria inclusive) to earn carbon credits called Certified Emissions Reductions (CER) (Carraro and Favero, 2009).

Although only about 3% of all CDM projects are cited in Africa and most of these projects are in South Africa (UNEP DTU Partnership, 2019), Nigeria has benefitted 12 registered CDM projects with six programs of activities (PoAs) (CDM, 2015).⁸ The registered CDM projects in Nigeria covers gas flaring, landfill gas, (efficient fuelwood) cooking stoves, municipal solid waste (MSW) composting, alternative fuels in cement facilities, and hydropower project. These projects were registered between 2006 and 2012

⁸ Most of the CDM projects are apportioned to Brazil, China, India and Mexico because CER buyers have preference for CDM projects with huge volume of emissions reductions. Meanwhile, SSA countries are agro-based economies with small scale projects which yield a low volume of carbon credits (Nyambura and Nhamo, 2014; Lütken, 2016).

and the PoAs are between 2011 and 2013 (Department of Climate Change, Nigeria, 2019). An approximation of 42% of the CDM projects in Nigeria is located in Delta State, 17% are cited in Lagos and Rivers State, 8% are in Niger and Ogun State, respectively, while the remaining 8% are shared amongst other States (Pillay, 2016).

The CDM has aided Nigeria on carbon emissions abatement potential but it has not benefitted the country in recent years. Lütken (2016) argues that the CDM's projects obvious skewed positioning in Brazil, China, India, Mexico, and South Africa require procedural and policy reforms for countries like Nigeria to benefit more from its carbon finance in coming years. The major challenge that the CDM finance faced in Nigeria is the risk of failure when adapting to changes in economic and political factors

Aside from the CDM, the World Bank carbon finance unit is another international scheme that focuses on reducing the economic burden of militating against climate change in developing countries. To scale up its energy sector, the World Bank recently approved \$486 million for Nigeria (World Bank, 2017). A citable approved project under the Bank's carbon suite called Carbon Fund for Europe (CFE) is the 2015 EarthCare solid waste composting project in Lagos State (World Bank, 2018a).

Africa enjoyed 14% of the World Bank's carbon finance portfolio as at 2014 (World Bank, 2014). Although this percentage is higher than the 2.9% from the CDM, Nigeria still struggles to access financial resources for low-carbon investments. With the launch of the Carbon Initiative for Development (CI-DEV) in 2011 to help the world's poorest countries to access carbon finance, SSA has been able to receive a larger share of carbon finance through the World Bank (World Bank, 2018b). However, due to the country's changed status from a low-income to a lower-middle income country, Nigeria is not part of the world's poorest countries to benefit from CI-DEV.

Financial barriers (i.e. high start-up costs, insufficient domestic funding and high perceived risk) and capacity barriers (i.e. lack of human capital and weak institutional coordination) are other reasons that have been identified as to why the usage of carbon finance mechanisms is inadequate in Nigeria (Elgar *et al.*, 2009). The need for more skills to tap into carbon financing options requires universities and (Federal and State) governments to intensify their efforts by delivering skills-based conferences, seminars, courses, and vocational programs on climate change adaptation and mitigation and carbon finance (Elgar *et al.*, 2009). Nigeria can take a cue from the Uganda Carbon Bureau. It has trained the public, private and financial sectors on how to scale up their participation in the international carbon market since 2006 (OECD, 2013). The African Development Bank's (AfDB) seminars to raise awareness of its staff, project owners and government agencies on the potential of carbon finance are other examples (AfDB, 2013). These actions are supportive of the findings of Buchner *et al.* (2012) that more actions are needed to help green investors to overcome their perceived risks and those of financial sectors and capital markets.

Due to its budget deficit policy, Nigeria has in the last decade made considerable efforts and reforms to encourage a more business-friendly environment that attracts Foreign Direct Investments (Agarwal, 2013). This has manifest itself as the World Bank's "Doing Business" 2018 ranking portrays that Nigeria is one of the top ten improvers (Doing Business, 2019). Since the financial barrier is general amongst SSA countries, to remedy it, regional economic communities (RECs) have been making efforts to help direct investment to small-scale low-carbon projects. The Economic Community of West African States (ECOWAS) has a fund that purchases carbon credits upfront from its member states to provide initial outlay for small and medium-sized enterprises (Nakhoda *et al.*, 2011). Nonetheless, a consistently large and sustained contribution from public sector financing with funding from the financial sector is continuously essential to finance low-carbon investments in Nigeria (Schaeffer *et al.*, 2014). This supports Falcone and Sica (2019) that green sectors experience bottlenecks from financial institutions and effective policy intervention in this regard is required pronto.

Similar to carbon finance mechanisms, SSA's access to climate funds is limited (UNECA, 2014). For instance, 6% of mitigation finance from multilateral sources was committed to SSA in 2015, as East Asia and the Pacific and Latin America and the Caribbean that received 15% and 13% respectively (AfDB *et al.*, 2016). Also, a large share of the climate funds approved for a country or multi-country projects (since 2003 to 2016) to SSA is concentrated in South Africa while Nigeria is left out (Barnard *et al.*, 2016).

On the way to resolve the challenge of large infrastructure deficit, the Africa Climate Change Fund (ACCF) was approved by the African Development Bank (AfDB) in 2014 (AfDB *et al.*, 2014). The ACCF represents the opportunity for AfDB to mobilise and implement climate finance for climate finance deficient African countries like Cape Verde, Kenya, Mali, Nigeria, Swaziland, and Tanzania (AfDB 2014). Part of the few climate finances enjoyed by Nigeria is the Climate Investment Fund (CIF) approved \$85 million renewable projects through the AfDB in 2012 (AfDB, 2012).

Since International climate financing mechanisms are inadequate, more resourceful and inventive ways of generating climate finance from both domestic and external sources need to be developed in Nigeria

(UNECA, 2014). The case of the Fund for Environment and Climate Change (FONERWA), established in 2012, in Rwanda is an example of such creative and innovative ways to cue into (Climate and Development Knowledge Network (CDKN), 2013). Nigeria should also learn from the experiences of the Green Fund in South Africa, and the mix of mechanisms and processes these two countries utilize to steer climate finance to their path for climate action purposes. These experiences are empirically supported by Azhgaliyeva *et al.* (2018).

Conclusions, suggestions and limitations

This paper examines the fiscal instruments adopted and adoptable in Nigeria going by the nation's climate change policies. Aside from using the Metcalf's Framework for Assessing Environmental Fiscal Reforms, the paper employs the SDG Index and Dashboard Indicators Framework in comparing Nigeria's experience with some African countries. The paper identified from our assessment that Nigeria's budgetary allocations and domestic public funds are not sufficient to meet its climate mitigation infrastructural deficit. So far market prices of carbon-related resources do not adequately reflect social costs of production and consumption in Nigeria as they do not reflect the true costs of carbon pollution for example the application of fossil fuel subsidy instead of fiscal reforms like renewable energy subsidy, low or no tariff on plug-in hybrid electric vehicles (PHEVs), carbon tax, etc. Due to insufficient support from international carbon and climate finance mechanisms among other reasons, the paper concludes that Nigeria needs to design, adopt and implement an optimal climate change fiscal policy mix that would ensure that market prices reflect social costs of production and consumption of carbon-related resources, promote green growth, and support its INDC commitments.

The policy recommendations arising from this paper are as follows: government needs to encourage creative and innovative ways of generating finance that will intensify green investments. Second, the private sector should be encouraged to be involved through financial institutions to provide green financial products and services to entrepreneurs of innovative green products. The market price of fossil fuel products can be made to reflect social costs of carbon pollution activities by charging carbon tax, issuing renewable energy subsidy or rebate and other suitable carbon-related fiscal instruments suggested in the paper. These policy recommendations are driveable in Nigeria if the government starts now to make efforts and take the necessary actions that will enhance improved clean energy (SDG 7) through innovation and development of infrastructure (SDG 9) without putting climate action (SDG 13) at stake.

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