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Funding for Greener Future:

Assessing the Evolution of Nigeria's Green Energy Finance Following the Implementation of SDG 7

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Introduction

From the past decades, the world has realized that transition to sustainable energy requires substantial amount of capital expenditure. 'The Sustainable Development Goal(SDG) 7: Ensure Access to Affordable, Reliable, Sustainable and Modern Energy For All' specifically addresses this aspect in its target 7.a and 7.b. These targets emphasize the need to promote international cooperation and investment in cleaner and more efficient energy transitions. Therefore, securing substantial financial resources has emerged as the primary hurdle we shall overcome to achieve SDG 7. In pursuit of this milestone, nations have initiated the issuance of green bonds to raise funds for extensive green projects, which has become a cost-effective and essential means of funding to support energy-efficient and green initiatives (World Economic Forum, 2021).

Despite being one of the lowest greenhouse gas emitters, Africa still stands as the continent most vulnerable to the impacts of climate change (World Development Indicators, 2021). Even though Africa is not at the forefront of green finance, the continent recognizes the significance of procuring green finance, acknowledging their direct connection to energy security (Hesary, et al). Following SDG 7 Target 7.b, highlighting the importance of expanding infrastructure and transition to sustainable development, especially for developing and the least developed countries, this research aims to focus on Africa's evolving green finance in terms of achieving SDG 7 with a special focus on Nigeria. The selection of Nigeria is because it is the largest oil-producing nation in Africa, coupled with a substantial reliance on fossil fuels. This choice offers a robust foundation for investigating the country's endeavors in transitioning to green energy after the establishment of SDG 7. Furthermore, Nigeria's distinction as the first issuer of Green Bonds among African nations, along with a comprehensive record of accomplishments in other green finance initiatives, provides a sound analytical background for the research. The purpose of this paper is to address the following questions:

1) How has Nigeria's green finance evolved? Has the inception of SDG 7 worked as a catalyst for the country's endeavors in securing green energy finance?

2) In the event of substantial growth or decline being identified, what policy implications can be addressed? If not, what are potential obstacles that hinder the pursuit of SDG 7?

Literature Review

Individuals may hold diverse perspectives when it comes to defining 'Green Finance.' Hesary et al (2022) characterized green finance as ‘a transformative shift from a traditional to a sustainable economy which involves financing both public and private green investments and supporting public policies that foster environmentally friendly initiatives. This directly addresses SDG 7, especially on target 7.a, calling for promoting investment in energy infrastructure and clean energy technologies. In terms of promoting energy efficiency highlighted in SDG 7, Target 7.2, Ratallack et al (2018) argued that the effective management of energy efficiency programs is achieved through fortifying business investments supported by appropriate economic and regulatory incentives. More importantly, studies have found the importance of augmenting resource allocation to facilitate technical assistance, public campaigns, and pipeline generation—essential components for advancing energy efficiency initiatives (He et al, 2019). Both studies emphasize that green finance stands as a potential contributing factor toward attaining the objectives outlined in SDG 7 and its associated targets.

On the other hand, one may point out that green finance may involve higher financing costs. In fact, Green Finance including Green Bond was historically perceived as an expensive funding source, but this perception has been reversed in more recent contexts. Contributions to the green financial system come from various sources, including multinational banks, institutional investors, central banks, and international financial institutions. These institutions provide measures such as priority-lending requirements, offering finance at below-market rates via interest-rate subsidies, and providing preferential central bank refinancing opportunities (Hesary et al, 2022). Particularly for African nations, this presents a more favorable condition for accessing substantial funding for large-scale green initiatives.

Building upon insights learned from the literature review, this paper will further explore how green finance has evolved in Nigeria and discuss how this progression aligns with and is explained by the implementation of SDG 7.

Methodology

Analytical method – Difference-in-Differences

As previously discussed, we are going to study Nigeria's effort and endeavor to achieve SDG 7 and this could be effectively measured by deploying the Difference-in-Differences (DiD) method(See Figure 1). This method is especially useful in terms of differentiating the post-SDG effect from other contributing socio-economic factors that may have brought changes in green finance in Nigeria (Treatment Group), which is possible by setting up a control group that has similar backgrounds except for the commitment and achievement in SDG 7. In this context, Chad, as a United Nations member country, is included as a control group for specific reasons. Three key factors underpin this selection: 1) geographical proximity bordering with Nigeria; 2) Its stagnated economic growth and industrialization which structurally hinders its potential and capability to achieve SDG 7; 3) its landlocked position renders Chad less susceptible to external turbulence. In other words, Chad provides a good analytical ground for observation to interpret the effect of post-SDG 7 implementation. The intervention period was set as 2015, the year that the SDGs were announced.

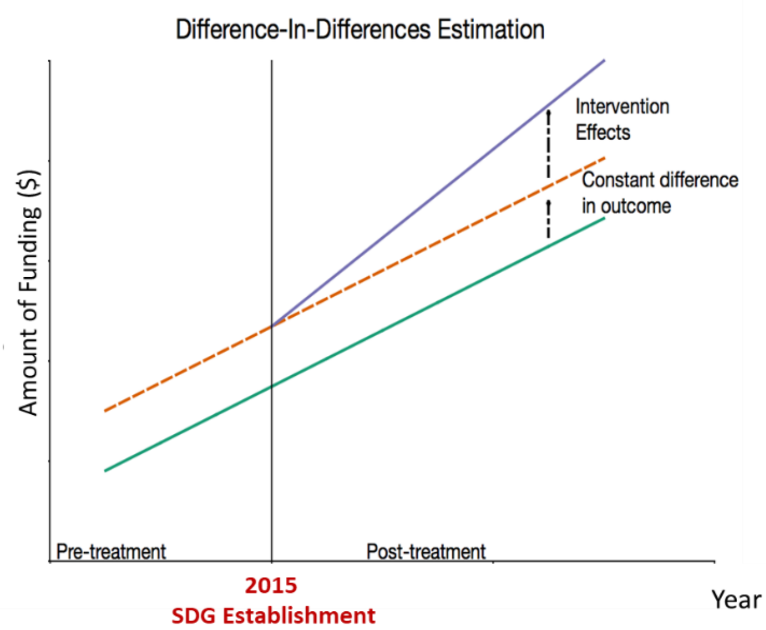

Figure 1 - Graphical Concept of Difference-in-Differences method

Deploying DiD method, below are the research hypotheses to be tested:

$$H_0\ (Null):\ There\ would\ be\ no\ significant\ growth\ in\ green\ finance\ after\ \mathrm{SDG\ 7}$$

$$H_1\ (\mathrm{Research\ Hypothesis}):\ There\ \mathrm{is}\ significant\ growth\ in\ green\ finance\ after\ \mathrm{SDG\ 7}$$

Based on the result of DiD result, the scope of the analysis would differ. If the treatment effect is valid, we reject the null hypothesis and discuss further about post-SDG measurements as suggested policy implications. If there is no statistical significance in terms of supporting the research hypothesis, we will turn to further observation on the possible hindrances in pursuing SDG 7.

Data Gathering for Measuring Green Finance in Nigeria

In this research paper, 'Green Finance' is defined as the summation of the major funding sources that may be granted for green energy projects. We assume there are three main categories including both debt and equity finance: 1) Green Bond; 2) Project Finance allocated to green projects only; and 3) Overseas Direct Aids (Official Development Assistance). The inclusion of Official Development Assistance (ODA) is based on the considerations related to the recipient country, encompassing the government's commitment to sustainable development and the prevailing institutional and social environment conditions (Neira et al., 2010; Ahn and Park, 2019). In essence, a higher amount of ODA signifies heightened governmental efforts to establish a conducive environment for the approval of ODAs. Regarding Green Bond issuance records, information has been sourced from the Bloomberg terminal and previous research studies. Project finance details and net ODA amounts for each country are publicly available through the World Bank Data. However, for Net ODA amounts, detailed information on how these funds are allocated to specific projects is not ascertainable. Consequently, the 'weight' assigned to energy projects for ODA is referenced from the OECD database, indicating that 5% of the total ODA amount was allocated to energy projects in 2021 (OECD, 2021).

Analysis – Evolving Trend of Green Finance in Nigeria (Post SDG 7)

Green Finance in Nigeria and Chad in Comparison Post and Pre SDG 7:

Focusing on details about overall green finance in both countries as depicted in Figure 2, we can observe a significant growth in the amount of green finance across all categories. Despite the widespread adoption of Green Bond as a funding method, its issuance in Africa remains in the early stages, particularly considering that Nigeria pioneered Green Bond issuance on the continent. Even so, the amount of green finance has significantly increased in all other categories. However, at this stage, we are unable to elucidate whether this substantial expansion is a direct outcome of SDG 7 or if it is influenced by other regional or socio-economic factors. To precisely gauge the shifts in the trend attributable solely to SDG 7, further analysis of the data using the Diff-in-Diffs methodology will be undertaken, as discussed in the following section.

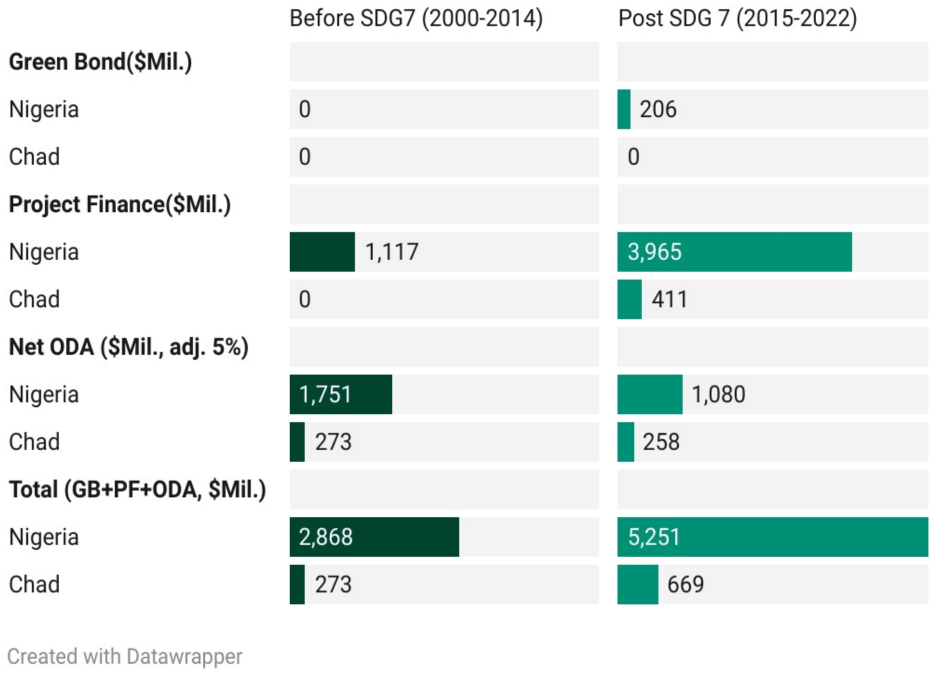

Figure 2 - Green Finance Comparing Pre and Post SDG 7 in Nigeria and Chad

DiD Analysis Result – We reject the null hypothesis

According to the DiD analysis presented in Figures 3 and 4, there is substantial statistical evidence, with a t-value exceeding 3.199 and a probability of 0.0414, supporting the rejection of the null hypothesis that there has been no significant growth in Nigeria's green finance after the establishment of SDG 7. In essence, we accept the main hypothesis, suggesting a discernible post-SDG 7 expansion in Nigeria's green finance.

According to the statistical analysis above, we could claim following suggestions:

First, Firstly, it implies that Nigeria has demonstrated a dedicated commitment to promote green finance within the country, particularly following the establishment of SDG 7 in 2015. This commitment serves as a proxy for Nigeria's sustained efforts in securing green finance, contributing to the broader objective of achieving SDG 7.

Second, it can be claimed that national interests, specifically in promoting green energy transition and investment domestically, align with the pursuit of global objectives such as the SDGs. Therefore, the establishment of global standards can function as a catalyst for sustainable growth within a country, as exemplified in the case of Nigeria. In other words, the setting of global objectives may play a pivotal role in fostering a country's sustainable development, particularly evident in the context of Nigeria's green finance.

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Call:
lm(formula = greenfinance ~ treated + time + did, data = diff_chad)

Residuals:
     Min       1Q   Median       3Q      Max
-2467.79  -216.93   -25.22    75.55  2661.81

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)    229.1      482.9   0.474  0.63991
treated       2172.3      683.0   3.181  0.00432 **
time           271.2      615.6   0.440  0.66390
did           2785.3      870.6   3.199  0.00414 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1080 on 22 degrees of freedom
Multiple R-squared:  0.8321,    Adjusted R-squared:  0.8092
F-statistic: 36.34 on 3 and 22 DF,  p-value: 1.063e-08
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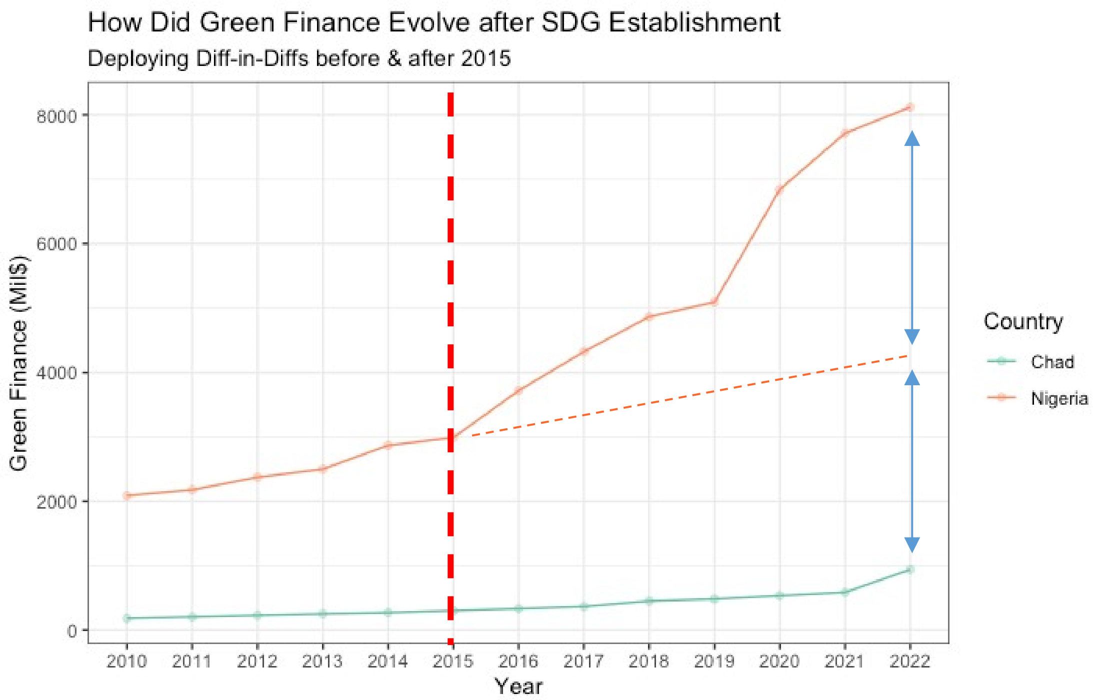

Figure 3 and 4 : DiD Analysis Results and Evolving Trend of Green Finance in Nigeria and Chad

Limitations

While green finance has the potential to contribute significantly to a nation's sustainable development, its widespread adoption may not be universally applicable, particularly in developing or least-developed countries. Sarkar and Singh (2021), drawing from their prior research, contend that financing and executing energy efficiency projects in developing economies often encounter challenges arising from insufficient liquidity and the unavailability of energy-saving technologies. Additionally, the efficacy of green finance in improving energy efficiency may be hindered by factors such as inflation, urbanization, and the need for robust institutional settings, aspects that are frequently not assured in many developing or least developed nations.

Another possible limitation is the variability in the definition of ‘green finance’, as introduced in the paper's introduction. The conceptualization of green finance presented in this paper may not encompass the entire spectrum of funding sources that could positively impact green initiatives, underscoring the complexity and diversity inherent in defining and implementing green financial mechanisms.

Suggested Policy Implications

From the comprehensive literature review and analysis presented earlier, several policy implications could be addressed, extending beyond the scope of SDG 7 to encompass a broader perspective on the role of the SDGs in fostering sustainable development within a country. The case of Nigeria provides valuable insights, revealing an absence of a trade-off relationship or prioritization conflict between achieving SDG 7 and pursuing national interests. Instead, it reflects a win-win strategy that benefits both individual countries and the global community. Again, this emphasizes the role of global objectives such as the SDGs as a 'platform' for individual countries to achieve growth and development at the national level.

In light of these observations, it becomes imperative to emphasize the need for well-designed objectives, targets, and scalable indicators, particularly in anticipation of the post-SDG era. Having these will not only facilitate enhanced participation from member countries but also enable the maximization of positive outcomes derived from the new set of objectives. This strategic preparation is essential for ensuring continued global cooperation and progress toward sustainable development goals beyond the current SDG framework.

Conclusion

This paper has captured the evolution of green finance in Nigeria after the SDG implementation in 2015. Significant efforts and notable growth in green finance were found in Nigeria, particularly in relation to SDG 7, focusing on target 7.a and 7.b. Expanding the perspective to encompass the broader scope of the SDGs, we have observed a harmonization of global targets and objectives, such as the SDGs, with national interests. This alignment serves as a robust platform for the pursuit of comprehensive sustainable development at the national level. This reinforces the imperative of establishing global objectives, exemplified by the United Nations (UN) SDGs, even beyond their maturity in 2030. Furthermore, this paper addressed the necessity of well-crafted objectives and targets, complemented by scalable indicators, as policy implications to effectively promote sustainable development to its optimal level.

As of January 2016, the SDG Actions Platform, composed of governments, the UN system, and a diverse array of stakeholders, was established to expedite the accomplishment of SDGs (SDG Actions Platform, 2023). Considering the UN's adaptability in addressing multifaceted global challenges and mediating diverse national interests (Rodrik, 2011), backed up by its competitiveness and extensive experience in global governance marked by a long history and proven track records, it is anticipated that the UN and the post-SDG objectives will continue to uphold a pivotal role in shaping the global landscape to promote global sustainable development.

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