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Exploring Green Bond Market Systems in Nigeria and South Africa

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by

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Declaration

I, Ryan Skirving, hereby declare that the work on which this dissertation is based is my original work (except where acknowledgements indicate otherwise) and that neither the whole work nor any part of it has been, is being, or is to be submitted for another degree in this or any other university. I authorise the University to reproduce for the purpose of research either the whole or any portion of the contents in any manner whatsoever.

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Abstract

The green bond ("GB") market has emerged as a promising mechanism for mobilising capital towards sustainable and climate-resilient infrastructure projects. However, despite global growth in GB adoption, the take up of GBs in African markets remains low. This dissertation explores the green bond market systems ("GBMSs") of South Africa and Nigeria using the Modified Jain Framework to evaluate and compare their respective market structures. The strengths, weaknesses, and opportunities for improvement of the two GBMSs were evaluated on five key metrics, namely: local bond market; policy guidelines and government support; certification; public versus private participation; and GB diversification. The study employs a quantitative research approach and uses secondary data from Bloomberg and regulatory reports to analyse the identified criteria.

The findings indicate that South Africa's GBMS is relatively more developed, scoring 13 out of 15 in the analysis, supported by a deep and liquid local bond market, a well-defined regulatory framework aligned with international standards, and relatively significant private sector involvement. In contrast, Nigeria's GBMS, while benefiting from a degree of government support, faces structural challenges such as limited market liquidity, weak certification practices, and a narrow issuer base, resulting in its score of 7 out of 15. The study identifies key policy and market interventions to enhance GB adoption in both countries, including increasing government participation, improving certification frameworks, introducing tax incentives, and expanding issuer diversity. This research provides a comparative analysis, offering insights for policymakers, investors, and stakeholders aiming to accelerate the growth of SA and Nigeria's GB markets.

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List of Abbreviations

Abbreviation	Description
#	number
˚C	degrees Celsius
bn	billion
bps	basis points
CB(s)	conventional bond(s)
CBI	Climate Bonds Initiative
CBS	Climate Bonds Standard
CO2	Carbon Dioxide
CTFH	Climate Transition Finance Handbook
DBSA	Development Bank of Southern Africa
DD	due diligence
DFI(s)	Development Finance Institution(s)
ESG	Environmental, Social, and Governance
EU	European Union
EUR	Euros
FSD Africa	Financial Sector Deepening Africa
FWB	Frankfurt Stock Exchange
GB(s)	green bond(s)
GBMS(s)	green bond market system(s)
GBP	Green Bond Principles
ICMA	International Capital Market Association
IFRS	International Financial Reporting Standards
IMF	International Monetary Fund
ISSB	International Sustainability Standards Board
JFW	Jain Framework
JSE	Johannesburg Stock Exchange
LSE	London Stock Exchange
MJFW	Modified Jain Framework
NAD	Namibian Dollar
NDC(s)	Nationally Determined Contribution(s)
NGN	Nigerian Naira
NGX	Nigerian Stock Exchange
NOK	Norwegian Krone
NSEC	Nigerian Securities and Exchange Commission
OSE	Oslo Stock Exchange
PPP(s)	Public Private Partnership(s)
SA	South Africa(n)
SAGFT	South African Green Finance Taxonomy
SDGs	Sustainable Development Goals
SSA	Sub-Saharan Africa
UN	United Nations
USA	United States of America
USD or $	United States of America Dollars
ZAR	South African Rands

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Chapter 1: Introduction

1.1 Background of the study

Despite being the lowest continental greenhouse gas emitter, Africa is one of the most susceptible regions to the effects of climate change (Ngwenya & Simatele, 2020b). Tyson (2021) explains that climate change is manifesting through rising temperatures, rising sea levels, and erratic weather patterns, and further notes that Sub-Saharan Africa ("SSA") in particular is becoming increasingly susceptible to climate-related impacts on its infrastructure, agricultural production and urban sustainability. This is corroborated by Archer et al. (2019), who studied non-seasonal rainfall patterns in South Africa and concluded that financing is needed to fund climate resilience, while Lee & Romero (2023) stress the importance of both climate change mitigation and climate change adaptation. The financial risks associated with climate change can be broken down into physical risks (direct damage as a result of a climate event such as a flood or storm), liability risks (insurers pay for damage claims arising from physical events) and transitional risks (financing means of climate change adaptation or mitigation) (Sartzetakis, 2020). These climate change adaptation and mitigation costs are in addition to the existing infrastructure cost requirements for the continent, which Duru & Nyong (2016) estimate will amount to annual investment opportunities in excess of $93 billion. Duru & Nyong (2016) further posit that new infrastructure will need to be built with the effects of climate change in mind to ensure that it is sustainable and will contribute to economic growth. Otek Ntsama et al. (2021) highlight that there is already a critical need for private capital to supplement public capital investments into climate mitigation infrastructure in Africa as the required infrastructure expense cannot be borne by governments alone. Green bonds ("GBs") may be a means to mobilise that private capital (Banga, 2019; Ngwenya & Simatele, 2020b; Taghizadeh-Hesary et al., 2022; Tyson, 2021).

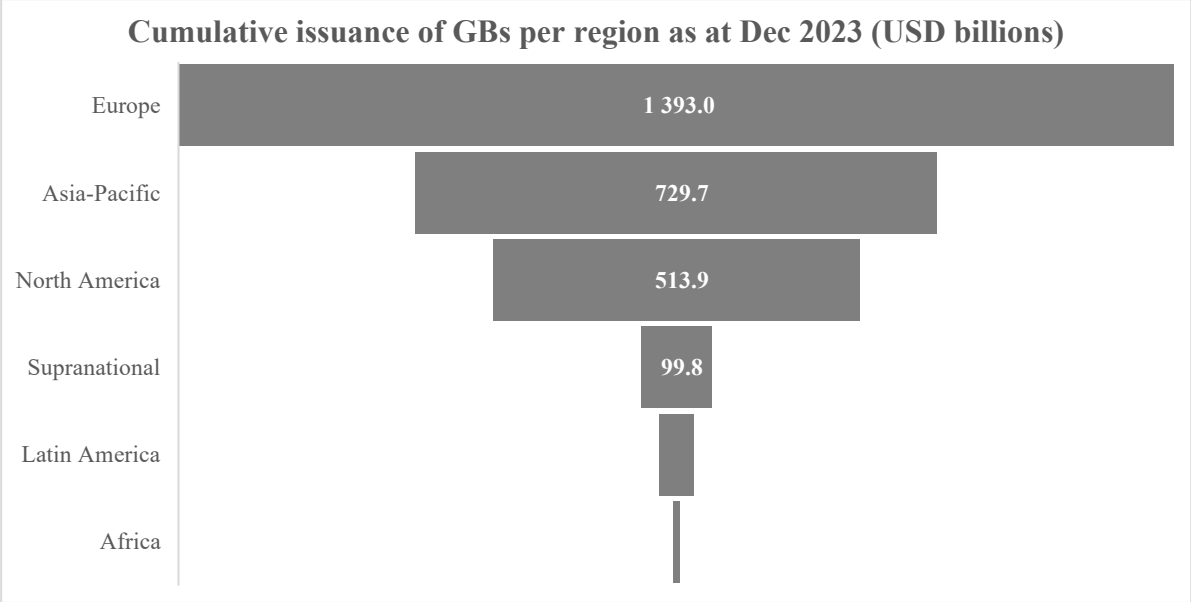
GBs are debt instruments that prescribe that the funds raised are restricted to uses for environmentally friendly, or green, undertakings (Banga, 2019). GB research indicates that Africa faces a significant funding shortfall for its required infrastructure development, and particularly for its infrastructure required for climate change mitigation and adaptation (Banga, 2019; Ngwenya & Simatele, 2020b; Taghizadeh-Hesary et al., 2022; Tyson, 2021). The same researchers agree that GBs could assist in plugging that funding gap, with Baldi & Pandimiglio (2022) suggesting that GBs have emerged as a pivotal financial instrument in the push for

sustainable development. The use of GBs to close the infrastructure and climate resilience funding gaps on the continent will also contribute towards notable international objectives, including the Paris Agreement goals (which strive for limiting global temperature increases to 2˚C above pre-industrial levels and providing financing to developing countries to mitigate and adapt to climate impacts (United Nations, 2024b)), and the United Nations' ("UN") 17 Sustainable Development Goals ("SDGs"), particularly Goals 6 - Clean water and sanitation; 7 - Affordable clean energy; 9 - Industry, innovation and infrastructure; 11 - Sustainable cities and communities; and 13 - Climate action (United Nations Department of Economic and Social Affairs, 2015).

GBs are becoming more prevalent globally, with issuances exceeding $1 trillion in key markets including the EU, USA, and China (Chouhan et al., 2024). This $1 trillion figure represents exponential growth since the first GB was issued by the European Investment Bank in 2007 and has been driven by increasing environmental awareness, regulatory support, and investor demand (Banga, 2019; Ehlers & Packer, 2017). Jain et al. (2022) suggest that investor demand for GBs will continue to drive up global issuances. This sentiment is echoed by Ehlers & Packer (2017), who note a strong demand from investors, and Sangiorgi & Schopohl (2021), who refer to an unmet investor demand for GBs in Europe. Empirical studies have examined the GB trajectory, highlighting how government policies, financial incentives, and the establishment of green finance taxonomies have facilitated market expansion (Jain et al., 2022). However, Baker et al. (2018) and Deschryver & de Mariz (2020) point out that the GB market remains small in comparison to the overall bond market, and the scale of the funding required for global environmental challenges, while Banga (2019) notes the expansion of the GB market in developed countries but suggests that the GB market in developing countries, including African countries, is lagging.

FSD Africa & Climate Bonds Initiative (2020) note that demand for GBs in Africa is growing, but that issuances have been slow. This is supported by Otek Ntsama et al. (2021), who found that less than 0.2% of the global value of GBs have been issued in Africa. While Africa's GB market shows potential, institutional barriers, a lack of investor confidence, and regulatory uncertainties hinder its development (Dave & Akongwale, 2024), with the result that GBs in Africa are not as widely used as they are in other regions, as demonstrated in Figure 1.

Figure 1: Cumulative issuance of GBs per region by 31 December 2023



Source: (Climate Bonds Initiative, 2024b)

Given the current funding shortage for climate-resilient infrastructure in Africa, and the potential for GBs to assist in plugging that gap, the initial consideration of this study was to determine how to increase the roll out of GBs in Africa, assuming that they will be used primarily to fund sustainable infrastructure. As there are 54 countries in Africa (United Nations, 2024a), this study could not study them all and this analysis was refined to focus on select African countries. South Africa ("SA") and Nigeria are the largest issuers of GBs in Africa and were thus selected for analysis. Section 2.3 provides more detail on how the list of African countries was whittled down to these two.

The issues around the roll out of GBs in SA and Nigeria, and how to increase that roll out, are very broad. Jain et al. (2022) argue that the prevalence of GBs in a country is dependent on its green bond market system ("GBMS"). The GBMS of a country includes its regulatory environment, the state of its existing bond and capital markets, considerations around who issues, purchases and certifies GBs (foreign versus local, public versus private and entity type), as well as the diversity of GBs available in that market (Jain et al., 2022). Against this backdrop, Jain et al. (2022) have developed a framework for comparing, scoring and ranking GBMSs, referred to in this study as the Jain Framework ("JFW"). The JFW shows promise as a means of analysing GBMSs, however, it has never been applied to African countries, and its applicability has not been tested in an African context. If applicable in this context, the framework could be used by various GB stakeholders - for policy makers, it could determine

which aspects of the local GB market to focus on in order to strengthen the GBMS and attract listings and investment; for issuers, it could inform their decisions around whether and where to use GBs to raise funding; for investors, it could assist in focusing their efforts on specific regions and GBs to invest in.

SA has 8 times as many listed labelled GBs as Nigeria (Bloomberg, 2024). It is therefore assumed that SA will have a stronger GBMS than Nigeria, but research to date has not quantified exactly where or how SA's GBMS is stronger. This research therefore aims to use the JFW to analyse the GBMSs of SA and Nigeria to better understand their respective developments, strengths and weaknesses.

1.2 Research problem statement and question

GBs have been identified as a possible means to plug the funding gap for sustainable infrastructure on the African continent (Baldi & Pandimiglio, 2022; Banga, 2019; Ngwenya & Simatele, 2020b; Taghizadeh-Hesary et al., 2022; Tyson, 2021). However, there are only 62 labelled African GBs listed on Bloomberg (Bloomberg, 2024). Ngwenya & Simatele (2020b) noted in their research that they did not come across any published academic literature on GB markets in Africa when collecting their data. Subsequently, some progress has been made, and a few studies have considered barriers to, or enablers of GB markets in Africa (Dave & Akongwale, 2024; Deschryver & de Mariz, 2020; Magale, 2021; Ngwenya & Simatele, 2020a, 2020b; Otek Ntsama et al., 2021; Taghizadeh-Hesary et al., 2022). However, the studies do not consider in any detail the GBMSs of African countries. Magale (2021) comes closest to studying an African GBMS through their consideration of the Kenyan regulatory environment for GBs as well as the levels of government support, the relative levels of local and foreign participation in Kenyan GBs, and a comparison of the Kenyan policies for GBs against the Green Bond Principles ("GBP"). Magale's (2021) analysis is relatively similar to the design of the JFW but excludes an analysis of GB currency and bond diversification, as well as the local capital market. Arguably the next closest analysis was conducted by Ngwenya & Simatele (2020b), who attempted to address their identified literature shortage by performing a case study analysis of GBs in the economic hubs in Africa, being Kenya, Nigeria and SA - economic hubs were defined as "specific places and spaces where there is a concentration of economic activities and which result in higher capital output" (Ngwenya & Simatele, 2020b, p. 892). However, the study focused on describing individual bonds rather than a GBMS, and while it did touch on GB related policies in the three countries, it only conducted a high-level

descriptive analysis of the policies and did not compare the market systems in those countries (Jain et al., 2022; Ngwenya & Simatele, 2020b).

While not performed in Africa, a comparison of GBMSs has been performed for selected Asian countries: Jain et al. (2022) noted that the majority of GB studies in different countries focussed on issuances, and concerns associated with the issuances of GBs. They took a different approach and sought to better understand the inhibitors and enablers of GBs in a country, which they considered within a country's GBMS (Jain et al., 2022). Jain et al. (2022) described a framework (the JFW) to analyse a country's GBMS and to convert the analysis into a score in order to compare the GBMSs of the countries considered. Jain et al. (2022) applied this in their study of the use of GBs for financing renewable energy in China, India, Indonesia, Malaysia, the Philippines, and Thailand. More detail is provided on the JFW in Section 2.5.2.

As far as this researcher has been able to determine, the JFW has not been applied to African countries in any published literature to date. This may raise questions about its applicability on the continent, with specific reference to SA and Nigeria. The problem therefore leads to the following research question:

How does the development of the GBMSs of SA and Nigeria compare to each other?

1.3 Research objective

As noted in the introduction, this research aimed to explore the relative strengths and weaknesses of African GBMSs in order to better inform GB stakeholders about GBs in their country of interest. However, given the scale of Africa, the research was confined to SA and Nigeria. The objective of this study is therefore:

To undertake a comparative assessment of the development of the GBMSs of SA and Nigeria

1.4 Justification of the study

This study will enhance the existing body of knowledge on GBs in Africa by assessing and quantifying, for the first time, the GBMSs of SA and Nigeria.

There is consensus that GBs could assist in funding sustainable infrastructure in Africa (Banga, 2019; Ngwenya & Simatele, 2020b; Taghizadeh-Hesary et al., 2022; Tyson, 2021). However, there is no existing literature on the analysis of GBMSs in Africa. This study aims to begin addressing that gap by analysing the GBMSs of some African countries, in this case SA and

Nigeria. It will assess the applicability of the JFW to SA and Nigerian GBMSs and justify modifications to the framework if necessary. This research will be informative for GB stakeholders to assess the GB market in potential countries of interest. Policy makers may use it to identify ways to improve their local GBMS in order to make their local GBs more attractive. Issuers should be better informed about where to list GBs to raise capital for their projects. Investors could use it to decide where best to invest their capital if they are considering investing in GBs or other sustainable investments.

1.5 Organisation of the study

Chapter 1 of this study introduces the infrastructure and sustainable infrastructure funding gap in Africa and the disproportionate impact of climate change on the continent. It shows that GBs have been suggested as a possible means to fill the funding gap but highlights the slow roll out of GBs on the continent. It explains that the roll out of GBs in a country is dependent on the country's GBMS and motivates for performing an analysis of the GBMSs of Nigeria and SA.

Chapter 2 conducts a review of the literature on GBs. The review is primarily focussed on African GB research, but is boosted by studies from Asia, Europe, and the USA. The review explains what GBs are and what a GBMS is. It highlights challenges and opportunities regarding GBs and explores GB pros and cons, and introduces the conceptual framework used as the basis for the research in this paper. It explains modifications made to the JFW and introduces the Modified Jain Framework ("MJFW").

Chapter 3 explains the methodology used for this study. It justifies the use of a quantitative analysis, and explains what information was sourced, from where, and how it was sourced. It explains how that information was analysed and how scores are allocated under the MJFW.

Chapter 4 presents a summary of the GBMS analyses conducted on SA and Nigeria. It finds that SA has a comparatively stronger GBMS than Nigeria across almost all metrics, which aligns with the empirically observed higher roll out of GBs in SA than in Nigeria.

Chapter 5 sums up the findings discussed in Chapter 4 and concludes that the MJFW can be used to assess the strengths and shortcomings of SA and Nigeria's GBMSs. It further suggests ways to strengthen their GBMSs to encourage further GB issuances in the future.

Chapter 2: Literature Review

2.1 Introduction

Chapter 1 introduced GBs as a potential mechanism to bridge the sustainable infrastructure funding gap in Africa.

This chapter expands on this premise by providing a comprehensive review of the literature surrounding GBs, their market dynamics, issuance processes, regulatory frameworks and challenges influencing their adoption. The chapter seeks to identify key drivers and barriers to the expansion of GB markets in SA and Nigeria and to determine a method to analyse their GBMSs.

GBs are positioned within the broader bond market, highlighting their characteristics, including the greenium (see Section 2.2.2.2), yield differentials, and volatility in comparison to conventional bonds ("CBs"). The challenges hindering the expansion of GB markets are discussed, including liquidity concerns, standardisation issues, the costs associated with issuing and verifying GBs, and opportunities to scale the GB markets through improved regulatory frameworks, government incentives, and enhanced investor awareness. The global GB standards are examined, which provide the foundational frameworks for GB market credibility, transparency, and certification. A comparative analysis of GB regulations in SA and Nigeria is performed, looking into the South African Green Finance Taxonomy ("SAGFT"), Johannesburg Stock Exchange ("JSE") requirements, Nigerian Green Bond Issuance Rules, and Nigerian Securities and Exchange Commission regulations. A comparison is also done against the Green Bond Principles and Climate Bond Standard to assess their alignment with internationally recognised best practice. After investigating and describing the fundamentals of GBs, the conceptual framework that forms the basis of this research is assessed. It describes GBMSs and their analysis through the JFW. However, the original JFW has limitations in capturing the nuances of African GB markets, and therefore this study proposes modifications to that framework to enhance its applicability in the African context. A MJFW, which incorporates additional considerations such as government incentives, certification processes, and a focus on local bond markets is proposed.

2.2 Understanding green bonds

2.2.1 What are green bonds?

A bond is a is a transferrable debt instrument that can be issued by companies, governments and other entities to finance or refinance projects or endeavours (FSD Africa & Climate Bonds Initiative, 2020). The instrument typically has a defined tenor (period of time in which it will be repaid), coupon (interest rate) and repayment method (ongoing or bullet, interest first or interest and capital) (FSD Africa & Climate Bonds Initiative, 2020). A GB is structurally the same as a CB but is differentiated in that its use of funds (i.e. what the money raised by issuing the GB is used to pay for) must exclusively be for environmentally friendly (or 'green') projects (Banga, 2019). GBs also carry an obligation to set green objectives and periodically report on both the use of the GB funds raised and the progress made towards achieving the stated green objectives (FSD Africa & Climate Bonds Initiative, 2020).

GBs are one of a suite of bonds with specified uses. Examples of other such bonds are provided in Table 1 below. GBs must be labelled as such on the relevant exchange on which they feature (FSD Africa & Climate Bonds Initiative, 2020). Different exchanges have different requirements for the green label to be applied to a bond, but listed bonds do not need to be labelled as green, even if they meet the criteria to qualify as one (Baker et al., 2018). Baker et al. (2018) further note that GBs can be labelled as such at the election of the issuer, or less commonly by a data provider such as Bloomberg.

Table 1: Non-exhaustive list of bond types (in addition to GBs) with specific uses of funds

Bond Type	Proceeds of bond required to be used for
Sustainability Bonds	Social and/or environmental benefits and are typically aligned to the SDGs.
Climate Bonds	Specific climate benefits like carbon capture or emissions reduction
Social Bonds	Projects with social outcomes like education or health
Blue Bonds	Projects with marine and coastal benefits

Source: Candidate summary from information presented by FSD Africa & Climate Bonds Initiative (2020)

While GBs are bond-like, and therefore in a form investors are familiar with (Jain et al., 2022), the limitation of the use of GB funds creates uncertainty, as "green" or "environmentally friendly" and other associated terms are generic and can encapsulate many different aspects or understandings of what counts as "green". The uncertainty created by the lack of standardised

definitions is a common issue in GB markets (Baldi & Pandimiglio, 2022; Banga, 2019; Dave & Akongwale, 2024; Deschryver & de Mariz, 2020; Ehlers & Packer, 2017) and creates a risk of greenwashing, which occurs when a GB does not meet its stated green outcomes or where it is labelled as green without actually being so (Deschryver & de Mariz, 2020; Sartzetakis, 2020).

2.2.2 Features of green bonds

As with CBs, GBs have varying coupons, tenors and repayment methods (FSD Africa & Climate Bonds Initiative, 2020). However, several studies have investigated whether GBs provide financial advantages over CBs, such as lower yields, reduced volatility, or increased demand from environmentally conscious investors (Hyun et al., 2021). These aspects are explored below.

2.2.2.1 Yield:

Baldi & Pandimiglio (2022) found that the yield of a GB is affected by a number of factors, including project size - larger projects are associated with lower yields - and Environmental, Social, and Governance ("ESG") ratings - a better ESG rating for a GB can mitigate the risk of greenwashing and decrease its yield compared to that of a project with a higher risk of greenwashing (due to nebulous targets or measurements of green outcomes). Baldi & Pandimiglio (2022) also noted sector differences, broadly stating that the more difficult the link between the industry and the green outcome is to prove, the higher the yield (an example used was that a marketing company will command a higher yield than a renewable energy one due to the intuitive link, or lack thereof, to a green outcome). It was also found that whether the entity is public or private matters as the yield typically goes from lowest to highest for Government and municipal bonds, then sovereign and multinational bonds, then corporate bonds (Baldi & Pandimiglio, 2022). Grishunin et al. (2023) found that higher GDP growth is associated with higher yields due to the relative attractiveness of equities in such a market, meaning debt requires a higher yield to be comparatively attractive to investors. Duru & Nyong (2016) note that, as with most debt instruments, the credit worthiness of the issuer impacts the yield of the GB and that less credit worthy investors must offer a higher yield.

The above describes the influences on the yields of GBs relative to each other, but what of the yield of a GB compared to that of a CB?

2.2.2.2 Greenium:

A greenium is the term used to describe a lower yield on a GB compared to an equivalent CB and is due to the non-pecuniary benefits associated with GBs (Baker et al., 2018). Grishunin et al. (2023) studied the greenium on GBs in the European market and found an average greenium of ~4bps and that greeniums have decreased over time as the supply of GBs has caught up with demand. The greenium observed in the study by Grishunin et al. (2023) was not evenly spread across the countries considered: for example, the average Greenium in the UK and Netherlands was between 2 and 3 bps, whereas there was no noticeable greenium in Germany or France. Grishunin et al. (2023) further found that factors that affect a greenium include the ESG rating of the instrument, where higher and externally verified ratings command a higher greenium (as much as 7bps); and the industry in which the issuer functions, with higher greeniums available in financial services and utilities (such as renewable energy) and lower greeniums available in sectors such as manufacturing. This aligns with the observations of Baldi & Pandimiglio (2022) on yields in different sectors.

Ehlers & Packer (2017) found mixed evidence on the prevalence of greeniums in the GB market globally, with some showing slight premia and some showing no premia at all. Baker et al. (2018) found greeniums range from 6bps – 26bps in their study of US GBs. Similar to Grishunin et al. (2023), Baker et al. (2018) found that greeniums are dependent on ESG ratings, external certifications and project size. Baker et al. (2018) further noted that bond tenor impacts the magnitude of a greenium, rather than the existence of one, with a larger effect observed as the tenor increases. Interestingly, Baker et al. (2018) pose the question whether the greenium received is sufficient to offset the additional costs of issuance and compliance that GBs must incur, but do not elucidate any conclusions on this. Magale, p. (2021, p. 6) suggests that "there is no credit enhancement to explain pricing differences between GBs and regular bond equivalents because they are both subject to the same market dynamics such as supply, rate expectations and geo-political issues".

It is clear from the above that there is no uniform or stable finding and expectation in relation to a greenium and they vary over time, across markets, and across sectors.

2.2.2.3 Volatility:

Pham (2016) considered the volatility of GBs compared to CBs. The study looked at both formally labelled GBs and unlabelled GBs. Unlabelled GBs in this instance encompassed bonds with clear green uses, for example, bonds issued by renewable energy firms. Pham (2016) noted

volatility clustering in GBs, observing that periods of high volatility follow periods of high volatility and vice versa. The study also noted that, given the homogeneity of GBs and their underlying projects, volatility clustering in labelled GBs was higher than in non-labelled ones. Pham (2016) further noted a spillover effect, where GBs are influenced by the CB market and that the larger the GB market, the more GB volatility aligns with the corresponding CB market. Pham (2016) concluded that as the GB market grows, GBs offer increasingly lower diversification benefits to investors and that returns on GBs increasingly mirror those of CBs.

2.2.3 Challenges associated with green bonds

Several studies list challenges associated with GBs, both from an issuer and an investor perspective. A concern for both parties is the lack of a secondary market (Anh Tu et al., 2020; Azhgaliyeva et al., 2020; Ngwenya & Simatele, 2020a). Given the relatively under-developed secondary bond market in many African countries (Andrianaivo & Yartey, 2009), GBs can be illiquid instruments that investors find difficult to exit, which may make them reluctant to purchase GBs in the first place (Banga, 2019). The creditworthiness of the market also affects the credit worthiness of its GBs by association and can play a role in the general interest in local GBs (Banga, 2019).

Another challenge is a potential currency mismatch: to attract investors, GBs may need to be issued in hard currencies, such as USD or EUR, while the underlying earnings are in a local currency (Magale, 2021). This mismatch increases the risk associated with the bond and may either dissuade investors or make the bonds prohibitively expensive for issuers (Magale, 2021). The lack of local service providers, such as third-party verifiers, consultants, investors, and auditors, poses another hurdle for GB transactions (Dave & Akongwale, 2024; Taghizadeh-Hesary et al., 2022). These services often need to be sourced internationally, which means that the cost of the service can be significantly higher than local market rates (Dave & Akongwale, 2024). This issue is exacerbated by poor-quality data on green targets and their achievement (Otek Ntsama et al., 2021), adding to an already costly issuance process (Deschryver & de Mariz, 2020).

A further challenge is the lack of standardisation in the GB market (Anh Tu et al., 2020; Azhgaliyeva et al., 2020; Deschryver & de Mariz, 2020; Pham, 2016). The absence of clear guidelines regarding what qualifies as “green” creates confusion for both issuers and investors. This ambiguity increases issuance costs and due diligence requirements, discouraging participation from both sides (Ngwenya & Simatele, 2020b; Taghizadeh-Hesary et al., 2022).

By extension, institutional weaknesses, particularly in regulatory frameworks and risk management systems, can also deter investors and reduce the willingness of issuers to list GBs (Magale, 2021).

Finally, while public sector involvement is a critical enabler for the GB market, scaling the market requires greater private sector participation (Jain et al., 2022). This can be achieved more effectively by diversifying GB applications beyond primarily urban infrastructure projects to include a wider range of initiatives (Ngwenya & Simatele, 2020b).

2.2.4 Opportunities to increase the scale of a green bond market

Several opportunities have been identified for increasing the adoption and rollout of GBs in a market. One key opportunity lies in government support**,** which can add depth and credibility to a market through government GB listings (Tyson, 2021). Governments can further facilitate private sector participation by offering incentives such as first-loss tranches, tax breaks, and cost-reduction measures for issuance and due diligence (Banga, 2019; Dave & Akongwale, 2024; Magale, 2021; Taghizadeh-Hesary et al., 2022). Similarly, African development finance institutions ("DFIs") and multilateral banks have the potential to act as centres of excellence for GBs by providing technical assistance, credit enhancement guarantees, and first-loss tranches that assist in crowding in additional investors and facilitating the issuance of GBs on the continent (Duru & Nyong, 2016; Magale, 2021).

Another opportunity lies in increasing awareness and education among both investors and issuers. Due to the relative lack of familiarity with GBs as an asset class on the African continent, targeted awareness campaigns and education initiatives can help bridge knowledge gaps and encourage more investments in - and issuances of - GBs (Anh Tu et al., 2020; Azhgaliyeva et al., 2020). Strengthened institutional frameworks also present a significant opportunity: these improvements include greater standardisation of GBs, enhanced trading platforms, and regulatory support (Otek Ntsama et al., 2021). Standardisation efforts should focus on defining what qualifies as "green" and establishing methodologies for quantifying and measuring environmental benefits (Deschryver & de Mariz, 2020; Jain et al., 2022). Additionally, public-private partnerships ("PPPs") offer a mechanism to unlock both public and private capital for financing necessary infrastructure, creating a collaborative environment for GB market growth (Anh Tu et al., 2020; Ngwenya & Simatele, 2020a). Lastly, international cooperation is another avenue for fostering GB market development (Adisa et al., 2024). By facilitating skill-sharing and standardisation efforts across countries, international collaboration

can ease the investment decision-making process for potential investors and simplify the GB issuance process for new issuers (Ehlers & Packer, 2017). The GB issuance process is described in the following Section.

2.2.5 Green bond issuance process

As described by FSD Africa & Climate Bonds Initiative (2020) and corroborated by Duru & Nyong (2016), the process for issuing GBs is the following:

2.2.5.1 Step 1: Identify qualifying projects:

Per ICMA (2022), 'qualifying projects' for GBs refers specifically to the project or asset that the GB is being issued to fund, not the entity issuing it. The qualifying uses of funds are described in Table 2.

Table 2: Qualifying uses of funds for GBs

Qualifying use of funds	Further information
Energy efficiency	New and refurbished buildings, energy storage, smart appliances and grids
Renewable energy	Relating to both production and transmission of renewable energy
Reducing and controlling pollution	Air, soil, waste, recycling, sewage management
Sustainable management of natural resources and land use	Sustainable agriculture, sustainable fishery, sustainable forestry, preservation and restoration of natural landscapes
Terrestrial and aquatic biodiversity	Protection and conservation of coastal, marine and watershed environments
Clean transportation	Reduced emissions in transportation
Sustainable water and wastewater management	Sustainable infrastructure for drinking and clean water, or water drainage in urban environments
Climate change adaptation	Modifications to existing infrastructure to make it more sustainable, early monitoring and warning systems
Circular economy	Design of reuseable and recyclable materials, components and processes
Green buildings	Meeting recognised standards for environmental performance

Source:(ICMA, 2022)

2.2.5.2 Step 2: Develop a GB framework

There are best practice examples of what should be included in a GB framework from sources such as the Green Bond Principles ("GBP"), Climate Bond Standards ("CBS") or EU Taxonomy (FSD Africa & Climate Bonds Initiative, 2020). The GB framework should explain what the funds will be used for, how the funds raised will be ring-fenced for that use, how monitoring of those funds will occur and how the stated green outcomes associated with the GBs will be measured, monitored and reported on – including measurement and reporting frequency on these above aspects (FSD Africa & Climate Bonds Initiative, 2020). The framework is designed at the discretion of the issuer, bearing in mind that an unclear framework increases the due diligence ("DD") burden on a potential investor (Duru & Nyong, 2016).

2.2.5.3 Step 3: Independent verification

In order to verify the information and approach disclosed by an issuer, third-party verification of the disclosed information should be sought (FSD Africa & Climate Bonds Initiative, 2020). While this is not compulsory, it does assist with reducing the DD burden on a possible investor, which can reduce barriers to making the GB investment (FSD Africa & Climate Bonds Initiative, 2020). This independent verification is similar to the audit of financial statements, and as with any audit, it can be beneficial to be verified by a well-known brand to enhance the perceived credibility of the rating (CBI, 2024a). The Climate Bonds Initiative ("CBI") website contains a list of approved third party verifiers under the CBS (CBI, 2024a). Given that SSA is considered to be a high-risk region for investment, independent verifications can assist in reducing the investment risk associated with GBs in Africa (Tyson, 2021).

2.2.5.4 Step 4: Issue the GB

This step is much like issuing a CB, but the bond must be specifically labelled as "green" (FSD Africa & Climate Bonds Initiative, 2020). In many places, this can be self-certification and enhanced by the independent verification process noted in Step 3 (ICMA, 2022).

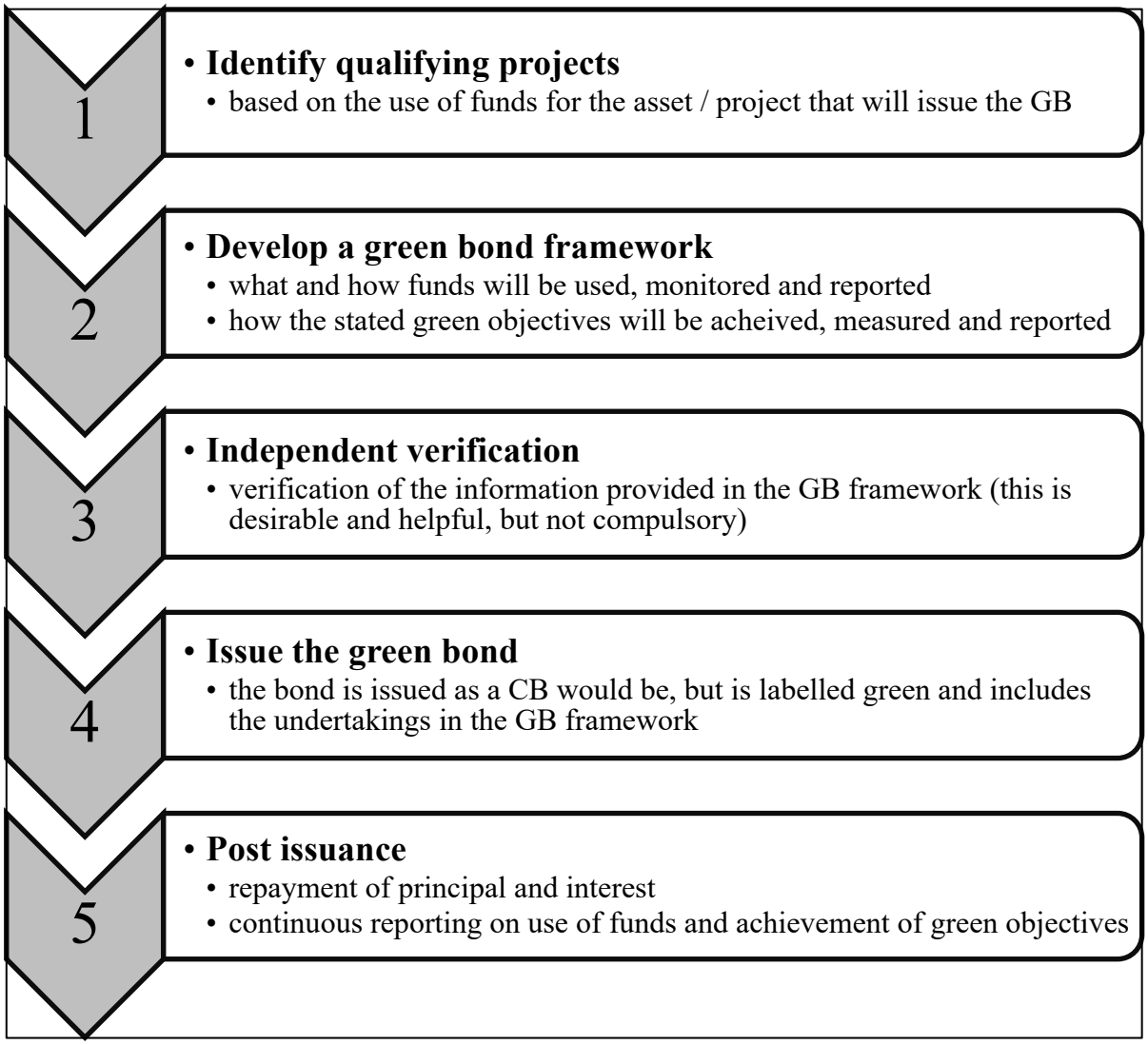
2.2.5.5 Step 5: Post issuance

As with CBs, the post issuance processes will include the repayment of principal and interest on the amount borrowed by the issuer (FSD Africa & Climate Bonds Initiative, 2020). However, unlike CBs, the GB post issuance process includes periodic reporting on the use of the funds raised through the GB and the progress towards meeting the stated environmental targets set out in the framework provided by the issuer over the life of the GB (ICMA, 2022).

The GB issuance process is summarised below.

2.2.5.6 Summary of the green bond issuance process

Figure 2: GB issuance process



Source: Candidate design from FSD Africa & Climate Bonds Initiative (2020) process

2.2.6 Green bond pros and cons

The information describing GBs and the market systems in which they operate can be distilled in a series of pros and cons for GB issuers, investors and broader stakeholders. The significant pros and cons of GBs are presented Table 3 below.

Table 3: Pros and cons of green bonds for issuers, investors and other stakeholders

Pros	Cons
For issuers	
GBs may allow borrowers to raise funds for projects that they otherwise may not have been able to access, through reasonably priced funding from tapping into resources that are focussed on environmental impacts as well as financial returns (Duru & Nyong, 2016). A GB may allow funding to flow from a wider pool of investors than an equivalent conventional debt raise would have accessed, which can have pricing benefits for the issuer (FSD Africa & Climate Bonds Initiative, 2020).	As noted in Section 2.2.3 above, the lack of standardisation is a barrier to wider rollouts of GBs. This is problematic in that it creates uncertainty and inconsistency for issuers around the standards they are required to follow (Deschryver & de Mariz, 2020).
Due to the investors that seek out GBs desiring environmental impacts as well as financial returns, these investors may be willing to accept a lower coupon rate (greenium) on a GB than an equivalent CB, which effectively reduces the cost of capital for the issuer (FSD Africa & Climate Bonds Initiative, 2020).	Given the addition of a GB framework, set environmental objectives, and an obligation for continuous reporting on both the use of the funds and the environmental objectives post issuance, ideally with independent audits to verify the information provided, the financial cost of issuing a GB is higher than that of an equivalent CB (Dave & Akongwale, 2024). The higher cost is especially pronounced for smaller projects and companies (Azhgaliyeva et al., 2020). The cost of issuance is further exacerbated for African issuers where the local market does not have the recognised skills or professionals to perform independent audits or to design sufficiently marketable GB frameworks. This then requires foreign expertise that is typically charged in a hard currency and at international rates, which further increases the relative costs for African issuers (Magale, 2021).
Investors may be willing to accept a longer tenor on a GB than for an equivalent CB, which can ease the repayment burden for issuers (Deschryver & de Mariz, 2020).	In Africa, there is often a lack of awareness of GBs as a possible investment class. This can mean that as investors do not know of GBs, they do not look for them. GB issuers either have to provide education on the class of asset or run the risk of not attracting sufficient local investment for their desired capital raise (Taghizadeh-Hesary et al., 2022).

Given the desirability and unmet investor demand for GBs in Europe (Sangiorgi & Schopohl, 2021), African GBs may attract foreign investment into Africa, particularly in regions without onerous exchange controls (Magale, 2021).	Given the required GB framework, the independent verifications and the ongoing reporting requirements, the complexity and administrative burden associated with GBs can deter potential issuers (Banga, 2019).
The issuance of a GB could enhance the reputation of the issuer through its association with environmentally beneficial objectives and the willingness to commit to the additional reporting requirements (FSD Africa & Climate Bonds Initiative, 2020).	
For investors:	
A good ESG track record is often recognised as a proxy for overall company efficiency. This level of comfort, combined with the transparent reporting requirements of a GB, can lead to enhanced risk management for the investor (FSD Africa & Climate Bonds Initiative, 2020).	The lack of standardisation of GB frameworks means the DD burden can be high for investors as they need to understand what is being offered and cannot simply take it at face value (Ehlers & Packer, 2017; Sartzetakis, 2020; Taghizadeh-Hesary et al., 2022).
Investors can contribute to projects that achieve climate change solutions as well as achieve their desired financial return (FSD Africa & Climate Bonds Initiative, 2020).	The lack of standardisation of GBs leads to a direct risk of greenwashing. For an investor, this means they will not be achieving their desired environmental impact or benefit. This risk has been cited as a major risk of GBs by many researchers, including Adisa et al. (2024); Baldi & Pandimiglio (2022); Herrera (2024); Jain et al. (2022); and Otek Ntsama et al. (2021).
Investing in GBs can allow investors to meet their internal ESG requirements (Magale, 2021).	Increased DD requirements given the risk of greenwashing means investors may not be able to justify the cost and effort of their DD work – particularly for smaller projects or raises (Banga, 2019).
	Underdeveloped capital markets in African countries can mean that the secondary market for GBs is very illiquid and that early exit options are limited for investors. This increases the risk associated with the investment and may deter certain investors (Anh Tu et al., 2020).

For investors, issuers, and broader stakeholders	
GBs can be used as a means to accelerate the roll out of PPPs (Taghizadeh-Hesary et al., 2022) and to bring private sources of capital into the funding of necessary infrastructure (Ngwenya & Simatele, 2020a).	Given the possible lack of local investors, there may be a great reliance on foreign investors for GBs in Africa. To justify the costs of the DD and investment in Africa, which is seen as a risky business location (Tyson, 2021), foreign investors often seek a pipeline of investable projects or sufficiently large projects to ensure sufficient uses for their investment funds (Duru & Nyong, 2016). This can be problematic for smaller projects and newer companies in Africa looking to issue GBs, as they usually have a single focus rather than a pipeline of projects (Duru & Nyong, 2016).
GBs can assist in achieving generational equity by using debt to spread the payment for an infrastructure asset across the generations that will benefit from it, rather than only one generation paying for an asset that multiple generations will benefit from (Sartzetakis, 2020).	Herrera (2024) found that municipal bonds in the USA do not have climate justice criteria and have typically benefitted wealthier cities and neighbourhoods. Herrera argues that GBs may have the same issue and equates the use of these funds to benefit already wealthier areas to greenwashing.
GBs can be a means to crowd in private sector funding for traditionally public sector assets, such as power plants or roads (Otek Ntsama et al., 2021).	There is a lack of reliable, quality information and data to identify, measure and track performance against green objectives (Otek Ntsama et al., 2021) which can be a deterrent for both investors and issuers.

Source: Candidate summary from sources cited within the table

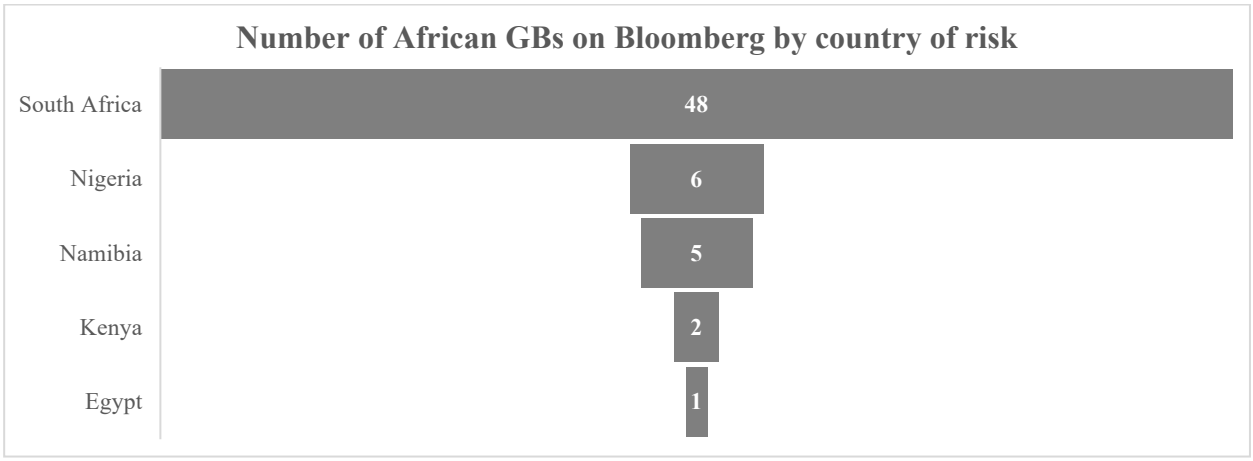
Many of the cons listed above can be overcome or may not even apply under a strong GBMS. Given the pros associated with GBs, this paper assumes that it is desirable to increase the roll out of GBs in Africa to plug the climate-resilient and sustainable infrastructure funding gap on the continent.

2.3 Overview of green bond markets in Africa

A labelled GB is one that the issuer has elected to be listed and named as a GB (FSD Africa & Climate Bonds Initiative, 2020). In considering GBs in Africa, labelled GBs were investigated on the Bloomberg database, and the information below was sourced from there.

Only 62 GBs have been listed in 5 countries in Africa (Bloomberg, 2024). The number of instruments per country is shown in Figure 3. The remaining 49 African countries were excluded from the study as they do not have any labelled, listed GBs.

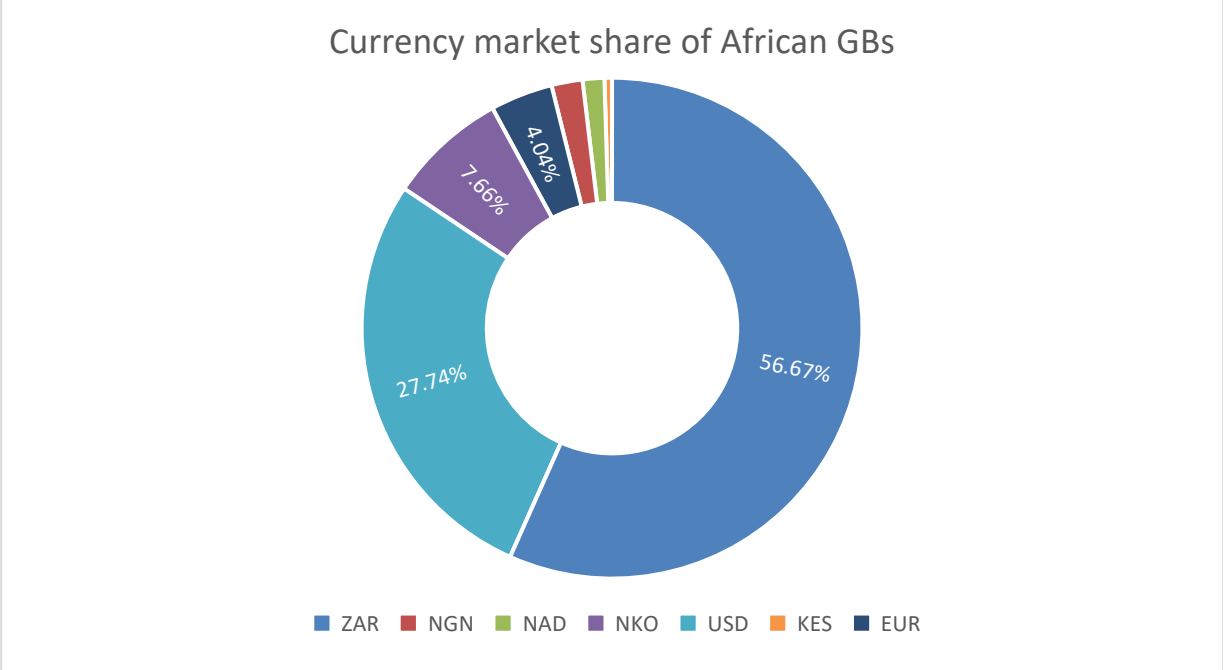
Figure 3: Country of risk for labelled African GBs on Bloomberg



Candidate estimates based on data from Bloomberg (2024)

Figure 3 clearly demonstrates that the majority of listed labelled GBs on the continent are associated with SA, with the second largest country being Nigeria. These two countries account for 54 of the 62 African GBs (87%). Figure 4 shows that over half the cumulative value of GBs listed in Africa is in ZAR denominated instruments, reinforcing SA's leading status.

Figure 4: Relative cumulative issuance of African GBs by currency. Cumulative values have been determined by converting the different currencies to USD

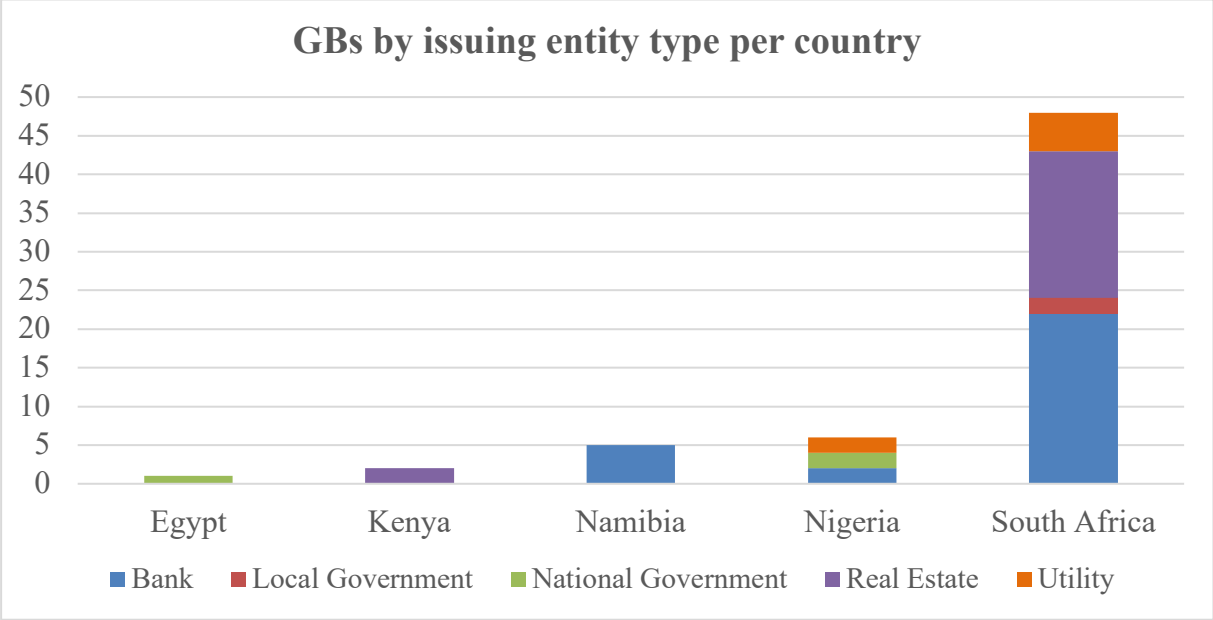


Candidate estimates based on data from Bloomberg (2024)

Figure 6 shows that Egypt, Kenya and Namibia's GBs are listed in a single currency (USD in Egypt, KES in Kenya, and NAD in Namibia). These countries lack diversity of issuance, however Figure 5 and 6 show that by contrast Nigeria and SA have a far greater diversity of issuers and currencies: Nigeria has 2 GBs listed by banks, national government, and utility companies respectively, while SA has 22 GBs issued by banks, 2 by local governments, 19 by real estate companies and 5 by utility companies. Nigeria has 5 GBs denominated in NGN and 1 in USD; and SA has 1 in EUR, 4 in NOK, 1 in USD and 42 in ZAR. SA and Nigeria also have the longest gap between the first and last issuance of GBs, as demonstrated in Figure 7 (10 years in SA, and 5 years in Nigeria, compared to a 4-year gap in Namibia and a single issuance year in Kenya and Egypt). Nigeria and SA therefore have far more diversity across the board.

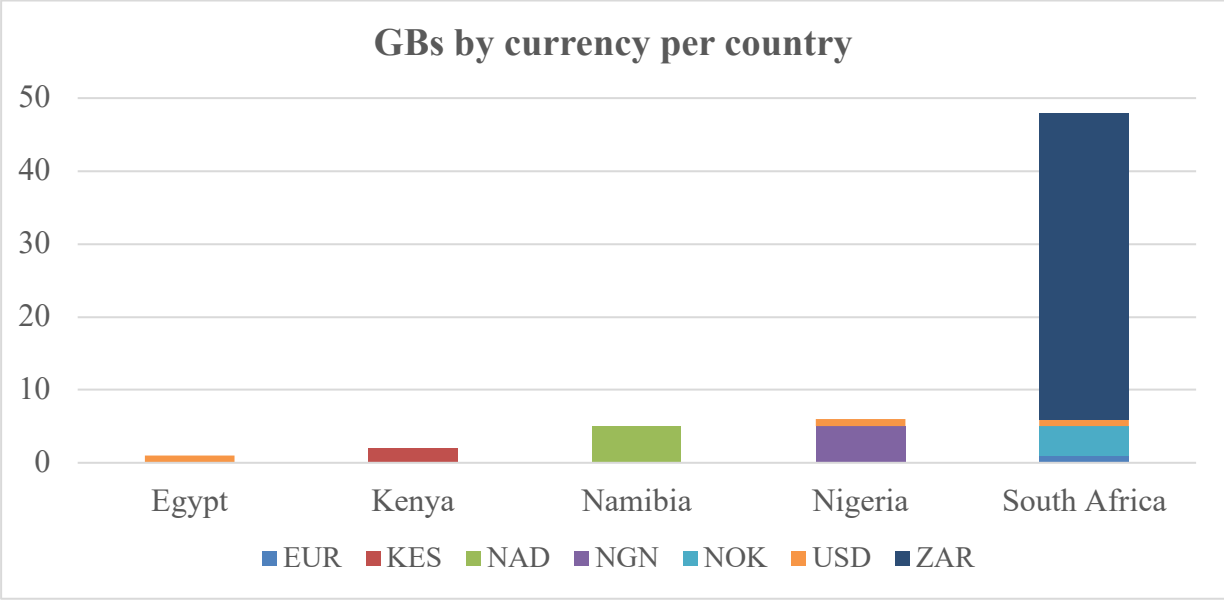
As at December 2023, Egypt was the largest economy in Africa ($393 bn), with SA second ($378bn) and Nigeria third ($363bn) (Trading Economics, 2024). Although Egypt was the largest economy in Africa in 2023, it had only 1 listed labelled GB on Bloomberg. For this reason, it was excluded from the study. Similarly, Kenya, with only 2 GBs and limited diversity, was also excluded. Although Namibia had 5 listed labelled GBs, it lacked diversity as all 5 were issued by banks, and for this reason was also excluded from the study.

Figure 5: African GBs by issuing entity type and country of risk



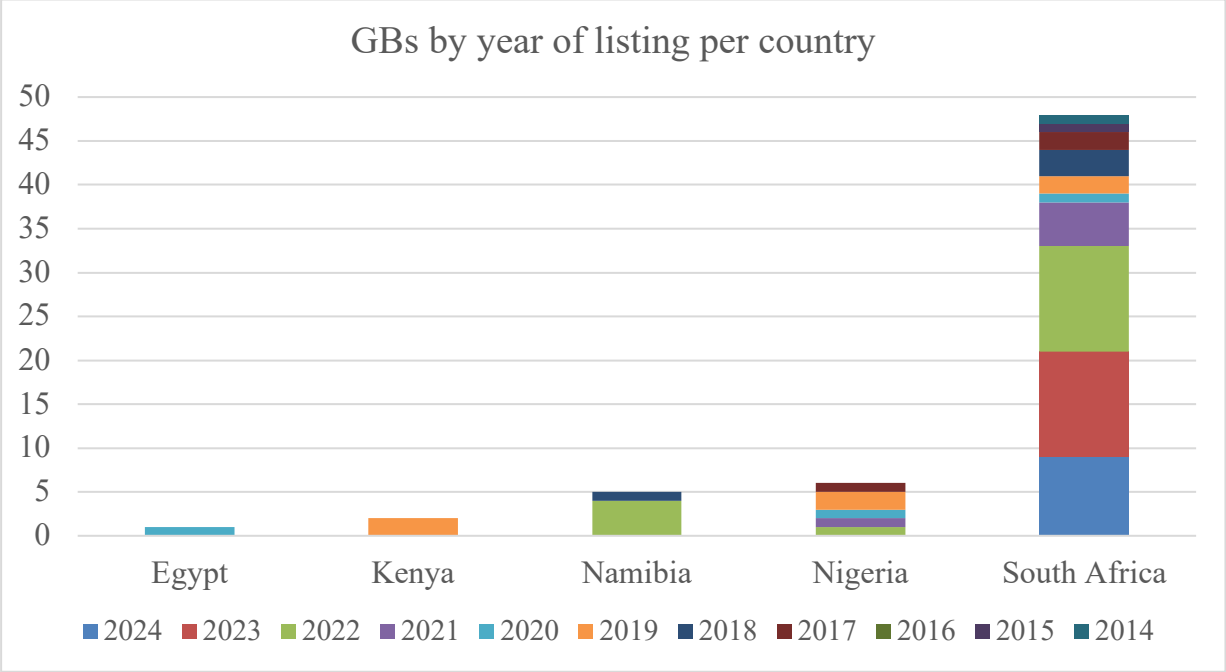
Candidate estimates based on data from Bloomberg (2024)

Figure 6: African GBs by currency and country of risk



Candidate estimates based on data from Bloomberg (2024)

Figure 7: African GBs by year of listing by country of risk. Source (Bloomberg, 2024).



Candidate estimates based on data from Bloomberg (2024)

All of the local currency GBs in SA (42) and Nigeria (5) are included within the scope of this study. The USD GBs in Nigeria and SA are both listed on the London Stock Exchange ("LSE") by banks from Nigeria and SA: Access Bank PLC and Standard Bank of South Africa Ltd respectively (Bloomberg, 2024). As these are listed by local banks in each country against assets located in their respective countries, they are included in the study. The EUR and NOK GBs that show SA as the country of risk are listed by Scatec (Bloomberg, 2024). Scatec is a Norwegian based company that operates a number of renewable energy plants in SA and develops renewable energy projects across Africa from its offices in Cape Town (Scatec, 2024). The NOK GBs are listed on the Oslo Stock Exchange ("OSE") and the EUR GB is listed on both the OSE and the Frankfurt Stock Exchange ("FWB"). Given that Scatec has a presence in SA and that these GBs are raised against SA renewable energy assets (Bloomberg, 2024), these 5 Scatec GBs are included in scope of the study.

Therefore, all of the listed labelled GBs per Bloomberg (2024) that list SA (48) and Nigeria (6) as their country of risk are included in the scope of this study. The next question is how the national GB frameworks of SA and Nigeria compare with international best practices.

2.4 Global green bond standards

Two of the pre-eminent global GB standards are the GBP and CBS (Ehlers & Packer, 2017; FSD Africa & Climate Bonds Initiative, 2020). The EU taxonomy for sustainable activities is also a significant piece of legislation for green finance, but is it designed for and required to be implemented in the EU, not Africa (European Union, 2024). For this reason, it has not been considered in this study.

2.4.1 Green Bond Principles (GBP)

The GBP provide voluntary process guidelines for the issuance of GBs to promote transparency, integrity, and sustainability in the global debt capital markets. These principles serve as a benchmark for issuers, investors, and underwriters in financing sustainable projects (ICMA, 2022). The core requirements of the GBP, recommended to be disclosed in a GB framework as per Section 2.2.5.2 above, relate to the process for selection and evaluation of applicable projects, the determination and measurement of the green objectives, the use and management of proceeds, and the reporting requirements on the use of funds and progress made against the stated green objectives (ICMA, 2022). The core requirements align with the requirements described in Section 2.2.5, including the recommendation for an external review of the GB and its framework (ICMA, 2022).

The GBP is supported by supplementary materials, such as the Climate Transition Finance Handbook ("CTFH") (ICMA, 2022). Published by the International Capital Market Association ("ICMA"), it provides supplemental guidance to issuers of climate-related financial instruments, including those aligned with the GBP (ICMA, 2022). The handbook focuses on ensuring the credibility of climate transition strategies, particularly for entities operating in sectors with less obvious links to green outcomes (for example a marketing company compared to a renewable energy one) (ICMA, 2023). The CTFH is designed to enhance the alignment of climate transition financial instruments with the Paris Agreement goals of limiting global warming to 1.5°C or, at minimum, 2°C below pre-industrial levels (ICMA, 2023). It emphasises transparency, accountability, and scientific rigour in developing and disclosing climate transition strategies (ICMA, 2023). The CTFH recommends that issuers disclose a clear, science-based climate transition strategy aligned with the Paris Agreement. It suggests that disclosures should include short, medium, and long-term greenhouse gas emissions reduction targets, a capital expenditure plan along with technological pathways to support these targets

and must report on governance structures, such as board-level oversight and accountability mechanisms, relating to the achievement of the targets (ICMA, 2023).

2.4.2 Climate Bonds Standard (CBS)

The CBS covers sustainability bonds in general but also provides specific guidance for GBs. In addition to the general GB requirements described under the GBP, the CBS includes sector specific eligibility requirements and criteria (Climate Bonds Initiative, 2024a). This is done to provide specific guidance for sectors with less obvious links to green outcomes, such as cement or steel manufacturing (Climate Bonds Initiative, 2024a). The CBS also allows up to 5% of the proceeds of GBs to be allocated for uses that do not fully satisfy the green usage requirements, as long as they are not for fossil fuel related objectives and contribute generally to green outcomes. These uses could include the general working capital requirements of a company rather than a specific green investment (Climate Bonds Initiative, 2024a). Unlike the GBP, the CBS explicitly prohibits the allocation of GB proceeds to fossil fuel exploration, production, or transportation, and natural gas projects or high-carbon land conversion (Climate Bonds Initiative, 2024a).

2.4.3 Comparison between GBP and CBS

Both sets of guidelines aim to ensure the integrity of GBs by providing guidance to enhance transparency, environmental impact assessment, and investor confidence (Climate Bonds Initiative, 2024a; ICMA, 2023). While both frameworks share the goal of promoting environmentally sustainable investments, their methodologies, scope, and implementation strategies exhibit differences that reflect their distinct purposes. The core difference is that the CBS serves primarily as a certification scheme for GBs (and sustainability bonds) (Climate Bonds Initiative, 2024a), whereas the GBP aim to provide principles to promote GB best practices (ICMA, 2023). The GBP are voluntary, and while they encourage external review to validate project eligibility and impact reporting, they do not make this mandatory (ICMA, 2023). The CBS is also voluntary, but, if an issuer elects to be certified according to the Standards, compliance with the principles is essential for a certificate to be issued. The CBS also has sector specific requirements, which may enhance the credibility of CBS-certified bonds but may also limit its applicability for issuers whose projects do not fit neatly within the predefined categories. The GBP are broader in their interpretation and are more widely applicable.

The GBP emphasise transparency, disclosure, and accountability. They provide flexibility for issuers, encouraging them to align their projects with broadly defined categories of green investment such as renewable energy, pollution prevention, and biodiversity conservation (ICMA, 2023). The four core components of the GBP, use of proceeds, processes for project evaluation and selection, management of proceeds, and reporting, serve as pillars for ensuring that GB issuers achieve their intended environmental objectives (ICMA, 2023).

The CBS is explicitly aligned with the goals of the Paris Agreement and emphasises scientifically based criteria to ensure that projects contribute to climate mitigation and adaptation (Climate Bonds Initiative, 2024a). Certification under the CBS involves mandatory pre- and post-issuance verification by approved external reviewers (Climate Bonds Initiative, 2024a), something that is not mandatory under the GBP.

Neither the GBP nor CBS are legally binding: issuers adopt them as part of their commitment to sustainability and market credibility (Climate Bonds Initiative, 2024a; ICMA, 2023), however, this voluntary nature has different implications under each framework. The GBP, with its emphasis on flexibility and broad applicability, is accessible to a wide range of issuers, from private corporations to public entities. Its open-ended guidance allows issuers to innovate within their GB programs while maintaining alignment with recognised principles. By contrast, the CBS's voluntary nature is tempered by its certification process, which imposes higher barriers to entry. In essence, this means that while fewer issuers may opt for CBS certification, those that do benefit from the heightened credibility and investor confidence that comes with being certified against more stringent standards.

Both the GBP and CBS emphasise the importance of reporting on the allocation of proceeds and the environmental impact of funded projects (Climate Bonds Initiative, 2024a; ICMA, 2023). However, the CBS provides more detailed guidance on post-issuance reporting, including mandatory annual updates that reaffirm compliance with the certification requirements. This level of oversight ensures ongoing alignment with the CBS and enhances accountability to investors and stakeholders (Climate Bonds Initiative, 2024a). The GBP, while also promoting regular reporting, allows issuers a greater discretion regarding the frequency and depth of their disclosures. This less prescriptive approach makes the GBP more accessible but may result in variability in the quality and consistency of reporting across issuers (ICMA, 2023).

The approach of each framework to international climate goals further highlights their differences. The CBS explicitly frames its criteria within the context of the Paris Agreement, emphasising projects that contribute to achieving net-zero emissions and climate resilience (Climate Bonds Initiative, 2024a). Its science-based approach ensures that certified projects align with recognised global benchmarks for climate action. While the GBP supports projects that address climate change and environmental sustainability, it takes a more inclusive approach by accommodating a wider range of environmental objectives, including natural resource conservation and biodiversity protection (ICMA, 2023). This inclusivity broadens the scope of the GBP but may dilute its focus on climate-specific outcomes.

Despite these differences, the two frameworks are not mutually exclusive and can be complementary (FSD Africa & Climate Bonds Initiative, 2020). The GBP provides a foundational framework for issuers seeking to enter the GB market, while the CBS offers a more specialised pathway for those aiming to achieve higher levels of environmental integrity and investor trust (FSD Africa & Climate Bonds Initiative, 2020). Issuers may use the GBP as a starting point for structuring their GBs and later pursue CBS certification to enhance the credibility of their offerings. A sequential adoption may reflect the evolving maturity of issuers and the growing demand from investors for robust environmental standards.

Given these globally leading GB frameworks, it is important to consider how the frameworks for GBs in SA and Nigeria compare.

2.4.4 Green bond regulations in South Africa and Nigeria

To understand the market dynamics in both Nigeria and SA, the relevant legislation is analysed and compared to the GBP and CBS. The local standards were found through a search on Google for the applicable GB legislation in each country, as well as a thorough search for specific policies referenced in other literature studied for this Chapter. Table 4 shows that SA has fewer pieces of relevant legislation than Nigeria, although each individual piece of legislation is more comprehensive.

Table 4: Scope of regulatory review in each country.

Country	Applicable regulations
Nigeria	• Nigerian Green Bond Programme • Federal Ministry of Environment Green Bond Guidelines • Nigerian Securities and Exchange Commission Green Bond Issuance Rules • NGX debt listing requirements • IFRS Sustainability Disclosure Standards
South Africa	• South African Green Finance Taxonomy • JSE Debt Listing Requirements • JSE Green Bond Segment Requirements

Source: Candidate summary from web and literature review

2.4.5 South African green bond policies and government support

SA's GB regulatory environment is primarily defined by the South African Green Finance Taxonomy ("SAGFT") and JSE Debt Listings Requirements (LexisNexis, 2020). Government support is provided through strategic policies and funding mechanisms, such as the Green Fund (The Green Fund & Department of Environmental Affairs, 2016).

2.4.5.1 Policy guidelines

The SAGFT, launched in 2022, provides detailed technical screening criteria for projects seeking classification as green (Taxonomy Working Group et al., 2022). Developed under the National Treasury's Sustainable Finance Initiative, the taxonomy aligns with international standards, including the GBP and EU Green Taxonomy, and encourages market participants to align their investments with the Paris Agreement goals (Taxonomy Working Group et al., 2022). It defines green economic activities based on their substantial contribution to environmental objectives, adherence to 'Do No Significant Harm' principles, and compliance with minimum social safeguards (Taxonomy Working Group et al., 2022). Its application spans sectors including renewable energy, sustainable agriculture, water management, and green transportation (Taxonomy Working Group et al., 2022). It offers clear eligibility criteria and reporting requirements, including disclosures of how proceeds contribute to predefined environmental objectives such as climate change mitigation or biodiversity conservation, for green projects and reduces ambiguity for both issuers and investors (Taxonomy Working Group et al., 2022). Using principles from the GBP, EU Green Taxonomy and Paris Agreement shows strong alignment with international standards. While this is a general guideline for green

projects in the country, GB specific requirements are laid out by the JSE, which is SA's largest and most recognised stock exchange (JSE, 2024).

The JSE plays a central role in SA's GB ecosystem by providing a bourse for the listing and trading of GBs on its Sustainability Segment, which is set aside for green, social and sustainable debt instruments (JSE, 2024). It is also a member of the UN's Sustainable Stock Exchange initiative (JSE, 2024). The JSE's Debt Listings Requirements govern both new applications and ongoing obligations for issuers of debt securities, including GBs (LexisNexis, 2020). The requirements mandate that issuers seeking to list GBs provide clear and timeous disclosures, including detailed use-of-proceeds statements, which outline the environmental objectives and anticipated impacts of funded projects (LexisNexis, 2020). Furthermore, issuers must commit to annual post-issuance reporting and are required to receive external reviews to validate the environmental credentials of GBs (LexisNexis, 2020). This is aligned with both the GBP and CBS.

2.4.5.2 Government support

In addition to regulatory frameworks, the SA government demonstrates support for green finance through initiatives such as the Green Fund. Established in 2012 and managed by the Development Bank of Southern Africa ("DBSA"), who were appointed by the Department of Environmental Affairs, the Green Fund serves as a catalytic financing mechanism to drive the country's transition to a low-carbon, resource-efficient, and climate-resilient economy (The Green Fund & Department of Environmental Affairs, 2016). A key objective of the catalytic funding is to crowd in additional private funding (from both local and international investors) to provide capital for green projects that may otherwise struggle to secure affordable financing (The Green Fund & Department of Environmental Affairs, 2016). The Green Fund prioritises social inclusion and local community upliftment as well as supporting climate mitigation and adaptation projects and by 2016, the fund had allocated over R1.1 billion to 55 projects, including investments in renewable energy, waste management, and biodiversity conservation (The Green Fund & Department of Environmental Affairs, 2016).

2.4.6 Nigerian green bond policies and government support

Nigeria's GB framework is informed by the Nigerian Securities and Exchange Commission ("NSEC"), the Nigerian Green Bond Programme, Green Bond Issuance Rules, and the Federal Ministry of Environment's guidelines, alongside broader sustainability disclosure initiatives,

such as the International Sustainability Standards Board's ("ISSB") International Financial Reporting Standards ("IFRS") Sustainability Disclosure Standards (CBI, 2018; ISSB, 2023b, 2023a; Ministry of Environment, 2020; NSEC, 2018). Note that while the IFRS Sustainability Disclosure Standards are not specific to Nigeria, they are a Nigerian requirement.

2.4.6.1 Policy guidelines

The cornerstone of Nigeria's GB regulatory framework is the Green Bond Issuance Rules, established by the NSEC in 2018 (CBI, 2018). These rules provide a structured pathway for issuers to engage in green financing (CBI, 2018). To qualify as green, projects must fall under specific categories including renewable energy, clean transportation, sustainable water management, and biodiversity conservation (NSEC, 2018). Issuers are required to provide detailed documentation including feasibility studies, independent assessments, and frameworks for proceeds management and impact reporting, which aligns to the CBS (NSEC, 2018).

The Federal Ministry of Environment complements the NSEC's regulatory efforts with the Nigeria Green Bonds Guidelines (Ministry of Environment, 2020). These guidelines link GB financing directly to Nigeria's Nationally Determined Contributions ("NDCs") under the Paris Agreement to reduce emissions by 2030 (Ministry of Environment, 2020). The guidelines emphasise the need for GBs to support climate mitigation and adaptation projects, such as solar energy deployment and afforestation programs (Adeojo, 2022). The Ministry also oversees the integration of GB initiatives into national development plans, ensuring alignment with broader economic and environmental goals (Adeojo, 2022).

Nigeria's policy landscape for GBs is enhanced by the Sustainability Disclosure Guidelines issued by the Nigerian Stock Exchange ("NGX") (NGX, 2024). These guidelines encourage listed companies to integrate ESG factors into their operations and reporting practices (Policy Development Facility Phase 2, 2019). The NGX also facilitates the listing and trading of GBs, offering a sustainable bond market platform that provides issuers with visibility and access to global investors (NGX, 2024). The exchange's partnership with the Luxembourg Stock Exchange promotes cross-listing opportunities, which hope to increase the liquidity and attractiveness of Nigerian GBs in international markets (NGX, 2024).

2.4.6.2 Government support

Government support for GBs in Nigeria is evident through the Federal Government's issuance of Africa's first sovereign GB in 2017: it raised NGN 10.69 billion to finance renewable energy

and afforestation projects and was followed by an issuance in 2019 that raised an additional NGN 15 billion (Bloomberg, 2024; Policy Development Facility Phase 2, 2019). These bonds were certified under the CBS and received positive third-party opinions (Adeojo, 2022). Moreover, the Nigerian Green Bond Programme involves inter-ministerial collaboration, including the Ministries of Finance, Budget and Planning, and Environment, to identify eligible projects and manage proceeds (Adeojo, 2022). Nigeria has also established a Green Bond Secretariat to oversee administrative and reporting obligations, related to its GBs (Policy Development Facility Phase 2, 2019). However, gaps in impact reporting and project monitoring have raised concerns about transparency and accountability (Adeojo, 2022), and there is limited take up of GBs in the country (Bloomberg, 2024).

2.4.7 Comparison to international standards

Both SA and Nigeria have developed regulatory frameworks for GBs that align, to varying degrees, with the GBP and CBS. While both countries aim to facilitate green finance and attract investment for sustainable projects, their approaches reflect differences in regulatory depth, market integration, and government support.

2.4.7.1 Comparison to the GBP

SA's SAGFT and JSE Debt Listing Requirements align closely with the GBP by defining eligible green activities, ensuring transparency in the use of proceeds, and mandating external reviews for credibility, albeit that external reviews are optional but advisable under the GBP (ICMA, 2022; JSE, 2024; LexisNexis, 2020; Taxonomy Working Group et al., 2022). Similarly, Nigeria's Green Bond Issuance Rules and Federal Ministry of Environment Green Bond Guidelines adhere to the core principles of the GBP by requiring issuers to clearly define eligible projects, disclose fund allocation, and report on environmental impacts (CBI, 2018; ICMA, 2022; Ministry of Environment, 2020). However, the implementation of these guidelines in Nigeria faces challenges, particularly in ensuring transparency and accountability in post-issuance reporting (Adeojo, 2022). By contrast, SA's framework appears more structured, benefiting from the regulatory oversight of the JSE, which mandates ongoing reporting and external verification (JSE, 2024; LexisNexis, 2020).

2.4.7.2 Comparison to the CBS

The CBS contains more stringent requirements than the GBP, including mandatory pre- and post-issuance verification and sector-specific eligibility criteria to ensure alignment with the

Paris Agreement (Climate Bonds Initiative, 2024a). SA's regulatory approach demonstrates strong alignment with the CBS, particularly through the JSE's Green Bond Segment Requirements, which encourage certification and detailed reporting (JSE, 2024). In addition, the SAGFT's focus on technical screening criteria mirrors the CBS's emphasis on science-based thresholds for green investments (Taxonomy Working Group et al., 2022).

Nigeria's approach also aligns with the CBS, as seen in its issuance of sovereign GBs certified under the CBS in 2017 and 2019 (Bloomberg, 2024). However, unlike SA, Nigeria lacks a dedicated taxonomy that establishes sector-specific eligibility criteria. The absence of a unified taxonomy makes Nigeria's framework less prescriptive compared to the CBS, leading to potential inconsistencies in project selection and impact assessment.

The GB regulations in each of SA and Nigeria are key pieces of their respective GBMSs. The following Sections outline how these fit into their GBMSs and how they are analysed.

2.5 Conceptual Framework

2.5.1 Introduction

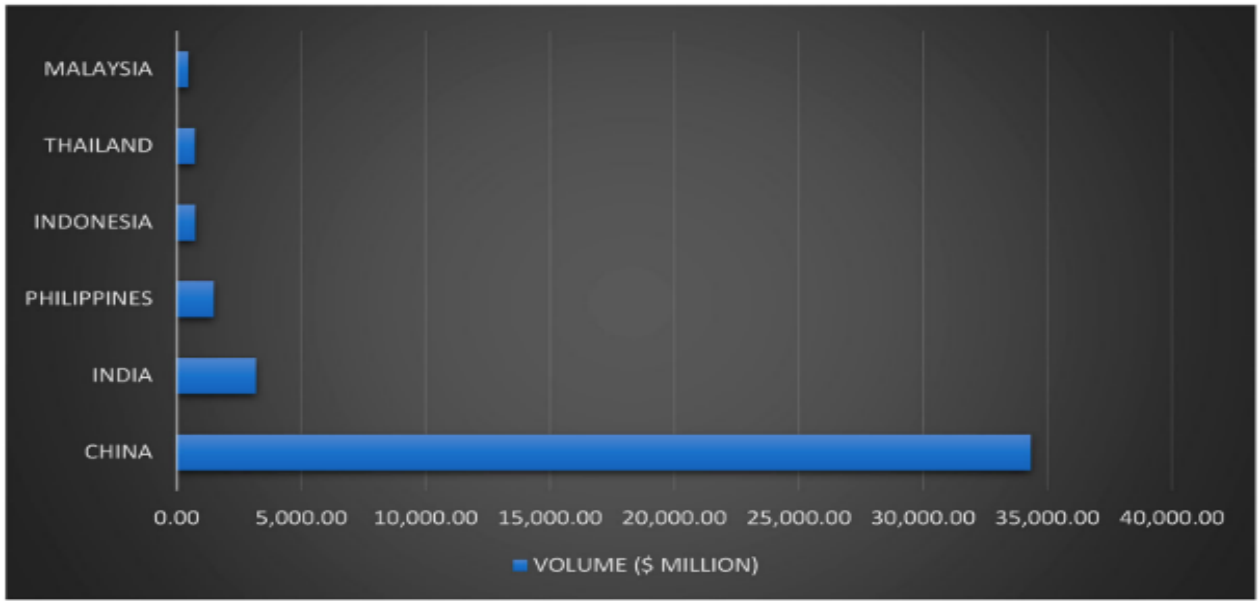
In the assessment of GBs, several challenges and opportunities, as well as pros and cons are listed by various authors (see Sections 2.2.3, 2.2.4 and 2.2.6). However, the studies often focus on specific components and adopt differing means of assessing the components of the GB market - they typically conduct interviews or workshops and analyse themes that come from them, or perform case study analyses (Anh Tu et al., 2020; Dave & Akongwale, 2024; de Deus et al., 2022; Magale, 2021; Ngwenya, 2022); or conduct strict quantitative analyses - typically when assessing GB volatility or greeniums (Baker et al., 2018; Baldi & Pandimiglio, 2022; Grishunin et al., 2023; Mutarindwa et al., 2024; Pham, 2016). Jain et al. (2022) take a different approach and define a GBMS in which GBs are present. They then compare the GBMSs of countries studied by presenting their work using a set framework. This framework is discussed below and ultimately forms the basis of the research conducted in this paper.

2.5.2 The Jain Framework

It was noted by Jain et al. (2022) that GBs are sold and considered within a GBMS and that the strength of a GBMS can explain the difference in roll out of GBs across countries. This was determined by considering the level of GB roll outs in 6 Asian countries - it was noted that China's roll out of GBs far exceeded those of India, the Philippines, Indonesia, Thailand, and

Malaysia, and that China's GBMS was also the strongest of that group, by some distance (Jain et al., 2022). The relative roll out of GBs in those 6 countries is demonstrated in Figure 8. This Asian dynamic can be likened to Africa, where SA is far ahead in terms of GB roll out (akin to China), Nigeria is second (as is India) and the remaining countries trail behind.

Figure 8: Issuance of GBs in selected Asian countries from 2012 - 2018



Source: (Jain et al., 2022)

While not named in the paper, Jain et al. (2022) developed a framework to compare the GBMSs of the countries they analysed (the JFW). Per the framework, the parameters that make up the GBMS in a country are its capital market, diversification prospects for GBs, public versus private dominance of issuance, local adaptation of GBs (related to local listings and use of local currencies), and policy guidelines and certifications (Jain et al., 2022). The components of the JFW are described below and summarised in Table 5.

The capital market analysis considers exchange controls on the local currency, ease of foreign investment, state of the local bond market and, for China - GBs as a proportion of the local bond market – while for the other countries, it presents a general analysis of the local bond market (Jain et al., 2022).

Policy guidelines and certifications includes a description of the country's GB regulations and guidelines, considering both the GBs framework design requirements and the ability and capacity for GBs to be certified in a country (Jain et al., 2022).

The diversification of issued GBs looks at who issued GBs and what the funds were used for (Jain et al., 2022).

The public versus private dominance considers if GBs have been listed by public or private entities (Jain et al., 2022).

Local conditions refer to localised guidelines and assistance at a provincial (rather than national) level within the country, although the research only speaks to this facet of the Chinese GBMS and not the other 5 countries studied, as the others do not have such region-specific parameters (Jain et al., 2022).

Table 5: Summary of the Jain Framework

JFW component	Component considers
Capital markets	• Exchange controls on local currency • Ease of foreign investment • Analysis of local bond market
Policy guidelines and certifications	• Local GB regulations and guidelines • Ability to be certified in the country of issuance
Diversification	• Number and variety of issuers • Variety of uses of funds
Public versus private dominance	• Are GBs listed by public or private entities • Relative mix between the two
Local conditions	• Local GB guidelines and assistance • Provincial / regional level (not national)

Source: Candidate summary from Jain et al. (2022)

In its assessment, the JFW incorporates various theoretical foundations: these include stakeholder theory, institutional theory and signalling theory.

The stakeholder theory, as posited by Freeman (2010), suggests that organisations should consider the interests of multiple stakeholders, including investors, regulators, and the broader society, when making financial and environmental decisions. The JFW considers private and public issuers, as well as the variety of issuers and what the funds raised are used for.

Institutional theory highlights the role of regulatory and policy frameworks in shaping market behaviour (North, 1990). These are considered by the JFW in the policy guidelines and certification analysis.

The Signalling theory, as discussed by Spence (1973) infers that GBs could provide a market signal regarding an issuer's commitment to sustainability, thereby attracting investors who place importance on ESG considerations.

While the JFW provides a useful starting point for the analysis of a GBMS in a country, some of the metrics used are geared towards China's GBMS and are less applicable to the other countries (explained in more detail below) (Jain et al., 2022). The JFW therefore requires modification to improve its applicability in an African, and specifically SA and Nigerian, context.

2.5.3 Modified Jain Framework

2.5.3.1 Changes to the Jain Framework

In this paper it is proposed that the metrics used in the JFW be modified in 3 places to increase the frameworks' applicability to SA and Nigeria. The local capital market analysis should be limited to the local bond market; the policy guidelines / certification criterion should be split into policy guidelines (including government support) and certification criteria; and the local conditions criteria should not be considered as there is no provincial level legislation in SA or Nigeria. This altered JFW will be referred to at the Modified Jain Framework ("MJFW"). The paragraph below explains why the local conditions criteria has been removed from the MJFW, and then each sub-section assesses the metrics that should make up the MJFW.

Jain et al. (2022) only describes the local conditions criteria in relation to China - not the other countries, given their lack of regional frameworks. Further support for excluding this criterion is that, while SA has had GBs listed by both the Cities of Johannesburg and Cape Town, it does not have separate regional GB requirements and neither does Nigeria. In addition, the listing of labelled GBs by the two SA cities informs the public versus private participation criteria of the MJFW (Jain et al., 2022). It is therefore repetitive to analyse it separately under its own criteria.

The 5 metrics that make up the MJFW will therefore be: local bond market assessment; policy guidelines and government support; certification; public versus private participation; and GB diversification. These are described below.

2.5.3.2 Local bond market assessment

Karim et al. (2022) found that the GB market in a country is dependent on its financial and bond markets, while de Deus et al. (2022) specifically studied local debt markets when comparing GB roll outs between China and Brazil to analyse the basis for the GB markets in each country. This is supported by Magale (2021), who notes that a country's GB market is strongly linked to the state of it local bond market and that an analysis of the country's bond market allows for a more specific assessment of the applicable conditions for GBs than an analysis of the wider capital market. This metric therefore focusses on the local bond market rather than the country's wider capital market. This approach is consistent with Jain et al.'s (2022) focus on local bond markets rather than wider capital markets in 5 of the 6 countries studied (excluding China). Those 5 have less developed GBMSs and a smaller number and value of GBs, which is more closely aligned to SA and Nigeria, rather than China.

Based on the research listed above, this metric should analyse the number, cumulative value, and number of distinct issuers of bonds listed on the local exchange.

2.5.3.3 Policy guidelines and government support

In this Section, the applicable local legislation and government undertakings are considered and compared to the GBP and CBS, as the alignment of a GB policy to international best practice is key to enhancing the credibility of a GB issuance (Baldi & Pandimiglio, 2022; Otek Ntsama et al., 2021). Liu et al. (2022) found in their study of Chinese GBs that ESG regulations and the institutional policy environment affected the growth of GBs in China and accounted for the rapid expansion of the GB market in the country. Similarly, Cheteni et al. (2025) found the regulatory environment to be a key factor in growing the SA GB market, a sentiment shared by Ngwenya (2022), and that education and awareness about the GB market is a critical area for its expansion. It was further noted that government policies combined with the financial system to increase the GB market in China compared to Brazil (de Deus et al., 2022). These studies highlight the importance of policy guidelines in a GBMS and suggest that this is an essential metric to be considered, but that it cannot be considered without an assessment of the level of government support for GBs in the market.

Government support is an important factor in enabling a greater roll out of GBs in a country (Banga, 2019; Dave & Akongwale, 2024; Magale, 2021; Taghizadeh-Hesary et al., 2022). While a robust GB policy may be an element of government support, it is worth highlighting additional levels of practical government support, such as tax breaks, credit enhancements and

the provision of funding, when considering the overall policy strength. This type of government support should therefore be specifically included in the policy guidelines criteria and the criteria should be renamed *policy guidelines and government support*.

2.5.3.4 Certification

Cheteni et al. (2025) found impact measurement and confidence in reported outcomes to be a key focus area in the SA GB market. Mutarindwa et al. (2024) found that in Africa, greenwashing is a concern for investors, and the certification of GBs unlocks benefits (such as a lower yield) that self-labelled bonds do not receive. Dave & Akongwale (2024) and Deschryver & de Mariz (2020) note that the lack of local service providers able to certify GBs is a hurdle to rolling out GBs in a country as this either increases the cost of issuance or decreases the credibility of the GB, or possibly even both. Local certification is therefore an important aspect of a GBMS.

It must be noted that the certification of a GB is not necessarily linked to the quality of the GB framework that the bond applies to - an issuer can receive an accurate certification in a bad framework, which increases the risk of greenwashing (Adisa et al., 2024; Baldi & Pandimiglio, 2022; Herrera, 2024; Jain et al., 2022; and Otek Ntsama et al., 2021). For this reason, certification should be a separate criterion from the regulatory environment (policy guidelines and government support) for local GBs.

This criterion therefore assesses the named certifiers of the listed SA and Nigerian GBs and specifically determines whether they have a local presence and office. A large array of certifiers in a country will score more highly than a lower number as there will be easier, and probably cheaper, access to certification services.

2.5.3.5 Public versus private participation

Ngwenya (2022) highlights the importance of partnerships with the private sector to achieve the funding requirements for necessary infrastructure in SA. In line with the JFW, this metric considers the balance between public and private listings – favouring private listings but requiring a base of government listings to add credibility to the market. Within the public listings, both national and local government listings are considered, but national government is considered as key to demonstrating governmental commitment to local GBs.

2.5.3.6 GB diversification

Wu & Liu (2023) found in a broad-based study of GBs in developed markets that investor sentiment in a market contributes to a greater contribution of capital to GBs – the sentiment of investors to GBs is demonstrated by the number of successfully listed GBs in the market, with more listings across segments encouraging further listings. GB issuer types are studied by de Deus et al. (2022) in a comparison of China and Brazil, which aimed to study differing GB roll outs in the 2 countries and determined that a larger variety of issuer types is beneficial for the local GB market. This criterion therefore considers the number of currencies, number of years of issuance of GBs, number of distinct entities and entity types that have issued GBs, as well as the number of exchanges on which the GBs are listed. Greater diversity is ranked more highly than homogeneity, as it demonstrates greater accessibility of GBs and a wider take up of GBs in the country.

2.5.3.7 Summary of the Modified Jain Framework

Table 6: Summary of the Modified Jain Frameowrk

MJFW component	Component considerations	Favourable outcome achieved (relative to others in the comparison)
Local bond market	• Number of bonds issued • Cumulative value of bonds issued • Number of issuers of bonds	• Increased number of bonds • Increased value of bonds • Increased number of issuers
Policy guidelines and government support	• Local GB regulations and guidelines and their alignment with international best practice (GBP and CBS) • Level of government support for GBs	• Robust regulations and guidelines • Alignment with international standards • Increased government support (participation / incentives)
Certification	• Number and location of certifiers • Ability to be certified locally	• More locally based GB certifiers
Public versus private participation	• Are GBs listed by public or private entities • Relative mix between the two • Private favoured	• Increased number and value of private issuance • Base level of government issuance to demonstrate national commitment
GB diversification	• Number of currencies • Number and type of issuers • Years in which issuances occurred • Number of exchanges listed on	• Increased variety across metrics

Source: Candidate summary based on (Jain et al., 2022) and modifications suggested in Section 2.5.3 above

2.6 Conclusion

Based on the potential to provide funding for a continent which has so far not been able to meet its funding requirements for sustainable infrastructure, and on the review above, this researcher believes it is worth investigating how the roll out of GBs can be expanded in Africa. The JFW provides a promising means to identify and compare the GBMSs of countries, which highlights the relative strengths and weaknesses of the GBMS and can indicate where GB stakeholders should focus their GB efforts in their desired location/s. However, modifications to the JFW are required to make it more suitable for analysing the GBMSs within Africa, and specifically SA and Nigeria, hence the proposed MJFW. This is the first formal analysis of the GBMS of African countries and starts to address the lack of previous analyses of this kind in the literature.

Chapter 3: Methodology

3.1 Introduction

This chapter presents the research methodology adopted for the study of GBMSs in SA and Nigeria. It details the philosophical underpinnings, research approach, and research design, ensuring methodological coherence with the study's objectives. The chapter provides a justification for the selection of a quantitative approach, grounded in the positivist paradigm and structured around deductive reasoning and numerical analysis. - given the emphasis on objective comparison, empirical measurement, and statistical evaluation, a quantitative methodology offers the most suitable framework for analysis and is best placed to answer the research question dealing with the comparison between the GBMSs of Nigeria and SA.

The chapter outlines the research approach, detailing how positivism informs the study's epistemological and ontological foundations. The deductive reasoning process is explained, demonstrating how the study applies predefined theoretical frameworks to empirical data. This is followed by a discussion of the comparative cross-sectional research design, which allows for a structured evaluation of GBMSs at a point in time. The methodology aligns with financial and economic research standards, incorporating descriptive and ratio-based statistical techniques to assess key market indicators.

The chapter further describes the data collection process, explaining the selection of secondary data sources, including Bloomberg market data, regulatory reports, and publicly available financial disclosures. The reliability and validity of these sources are addressed, and the data analysis methodology is discussed, particularly the application of a structured scoring system to compare the two GBMSs. The scoring system employs ratio-based evaluations and predefined scoring thresholds to facilitate structured comparisons.

Finally, the chapter discusses the limitations of the study, acknowledging the constraints associated with data availability, market comparability, and the chosen scoring methodology, and provides future research directions, including potential comparisons with other markets.

3.2 Research approach

When selecting research methods, a researcher should align the approach with the philosophical underpinnings of ontology (the nature of reality), epistemology (the nature of knowledge), and axiology (the role of values in research) (Tuli & Educ, 2010). The research approach described below is cognisant of, and described within, this context.

3.2.1 Quantitative approach

Research methodologies are generally classified into qualitative, quantitative, and mixed methods approaches, with each approach grounded in distinct epistemological and ontological assumptions (Creswell, 1994). A quantitative approach ensures objectivity, comparability, and empirical rigour (Creswell, 1994). Quantitative research is underpinned by the positivist paradigm, which assumes that knowledge is objective, measurable, and independent of individual perception (Swanson & Holton III, 2005). The positivist epistemology posits that reality exists independently of human interpretation and can be objectively measured (Peirce & Burks, 1960). Unlike qualitative research, which seeks to understand socially constructed meanings, quantitative research focuses on empirical verification, numerical analysis, and hypothesis testing (Creswell, 1994) and is well-suited to financial market research, where data is numerically defined and statistically analysable (Saunders et al., 2019).

A major advantage of the quantitative approach is its ability to facilitate comparative evaluation across different market contexts (Basias & Pollalis, 2018). The structured use of numerical indicators and scoring systems ensures that findings are replicable and generalisable, and reliance on ratio-based scoring, statistical benchmarks, and secondary financial data reinforces the empirical credibility of the study (Creswell, 1994). This study adopts a quantitative approach, as it is suited to examining relationships among the variables describing the GBMSs of SA and Nigeria, using structured criteria and a numerical scoring system.

This study follows a deductive reasoning process, which is characteristic of quantitative research: deductive reasoning begins with a theory or established framework, from which hypotheses are formulated and tested against empirical data (Peirce & Burks, 1960). This contrasts with inductive approaches in qualitative research, where theories emerge from observed patterns (Swanson & Holton III, 2005). The use of the MJFW in this study exemplifies deductive logic, as it applies structured evaluation criteria to assess the relative strengths and weaknesses of the GBMSs of SA and Nigeria.

This study employs a cross-sectional research design, meaning that data is collected at a specific point in time rather than over an extended period (Creswell, 1994). A cross-sectional approach is appropriate for assessing financial market structures, as it provides a comparative snapshot of performance (Saunders et al., 2019). While longitudinal studies could offer insights into market evolution (Saunders et al., 2019), the primary objective of this research is to compare GBMS performance at a point in time, which favours the cross-sectional approach.

Reliability and validity are central concerns in quantitative research: reliability refers to the consistency of a measurement, ensuring that the same approach yields similar results across different applications (Swanson & Holton III, 2005); validity, on the other hand, is concerned with whether the study accurately measures what it intends to assess (Swanson & Holton III, 2005). This study relies on secondary data analysis, drawing from regulatory reports, market disclosures, and financial databases. Reliability is ensured through the use of secondary financial data from trusted institutions such as Bloomberg, while validity is reinforced by aligning evaluation criteria with established GB standards. This study applies financial data analysis techniques, using metrics such as bond market depth, issuer diversity, and certification structures to assess GBMSs. The structured scoring system and predefined thresholds allow for consistency and replicability in evaluation (Creswell, 1994).

3.2.2 Justification for the approach

A quantitative approach is typically appropriate when the research assumes a positivist ontology - that reality is singular, objective, and measurable - and is grounded in empiricist epistemology, where knowledge is derived from observable and measurable phenomena (Al-Ababneh, 2020). In such studies, axiology is minimised, as the researcher aims to remain detached and objective (Al-Ababneh, 2020). Conversely, a qualitative approach is more suited to a constructivist ontology, where reality is understood as subjective and socially constructed, and an interpretivist epistemology, which emphasises the subjective interpretation of knowledge: in this context, axiology acknowledges that the researcher's values and perspectives play a significant role in shaping the inquiry (Al-Ababneh, 2020). A mixed-methods approach, on the other hand, integrates both positivist and constructivist paradigms to address complex questions, leveraging the strengths of both qualitative and quantitative data sources for a more pragmatic analysis (Al-Ababneh, 2020).

The selection of a quantitative methodology is justified by the study's emphasis on numerical measurement, structured analysis, and objective comparisons (Creswell, 1994). A qualitative

approach would not be appropriate, as it relies on subjective interpretation rather than empirical validation (Saunders et al., 2019). Similarly, a mixed-methods approach is unnecessary, as the study does not require exploratory insights or interpretive analysis (Saunders et al., 2019).

The selection of a comparative quantitative approach is justified by the need to assess market depth, issuer diversity, regulatory frameworks, and certification practices. One of the defining characteristics of quantitative methodology is its reliance on structured data collection, numerical analysis, and statistical inference (Creswell, 1994), and one of the key methodological components of this study is the use of a structured scoring system to compare GBMSs. This approach aligns with financial benchmarking techniques used by institutions such as the IMF and World Bank (Čihák et al., 2012). The scoring system assigns numerical values to the GBMS criteria, enabling structured comparisons. Descriptive statistics provide an overview of market depth, issuer diversification, and currency composition, while ratio-based scoring enables structured evaluation (Tuli & Educ, 2010).

3.3 Research design

This study falls under a comparative research design, which involves systematically contrasting two or more cases using predefined criteria (Bryman, 2016).

3.3.1 Applicable framework

This study will be performed using the MJFW. In line with the study performed by Jain et al. (2022) and described in Section 2.5.2 above, the outcome of this research will be a table presenting a country wise comparison and ranking of the GBMSs of Nigeria and SA. The metrics analysed will be those under the MJFW, as described under Section 2.5.3 and summarised under Section 0.

3.3.2 Data source

The data for the local bond market analysis was collected from the Bloomberg database. It was collected by searching for “bonds” and filtering for “South Africa” and “Nigeria” and was used to assess the local bond market criterion.

The study considers all 54 GBs on the Bloomberg database that list SA and Nigeria as the country of risk – as per Section 2.3 above. The GB specific data was collected from the Bloomberg database by searching for “Green Bonds” and filtering for “Africa” and “labelled” GBs.

The legislation described in Section 2.4.4 was collected from publicly available information on the world wide web. A search of tax incentives, government incentives and government support for GBs was done via Google to identify mechanisms for government support of GBs in each country. These were used to assess the policy guidelines and government support.

The GB information from Bloomberg was used to assess the public versus private dominance and GB diversification criteria. It also informed the certification criterion by listing which entities provided certifications for their GBs. Information on the certifiers was gathered from Google by searching for each specific verifier's website to understand where they are based and how large their footprint is.

3.3.3 Data analysis and scoring system

For this study, the comparative approach is the most appropriate, as it applies a predetermined framework to analyse GBMSs, allowing for structured comparison and systematic application of the MJFW. The data analysis for each category was performed as described below.

3.3.3.1 Background to the scoring system

The outcomes of the analyses were compared to each other and assigned a score between 1 and 3, where 3 is the best score and 1 the lowest. In line with the methodology used by Jain et al. (2022), scores were assigned for each metric and a total score out of 15 was determined for each country.

Jain et al. (2022) did not define a baseline score or criteria of what outcome correlates with what score. It appears in the paper that the score is based on a comparison of the countries investigated, in other words, it does not provide a criterion for what a 3 out of 3 should look like but rather provides a means to differentiate between the countries being compared (Jain et al., 2022). This relative benchmarking approach is similar to that applied by Čihák et al. (2012) in their World Bank Working Paper describing the introduction of a then-new database that compared global financial systems. The relative approach is replicated in this study, meaning that, for example, SA could score a 1 relative to Nigeria for a given metric, but may score a 2 or 3 for that same metric if compared to a country such as France or China. A positive aspect of this method is that the GBMSs in question are assessed against each other and not graded down because, for example, a European GBMS may be more developed. However, this is also a limitation of this method in that a score for a given GBMS may be artificially inflated because of poorly rated competitors rather than because of a highly rated GBMS. This infers that users

of the framework need to decide on an appropriate baseline country for the purpose of anchoring the scoring to a market that they are familiar with.

A notable difference between this study and the one conducted by Jain et al. (2022) is that, where the JFW does not define how scores are determined under each metric, this study does define how those scores are determined. The method for comparing markets is described in detail in order to increase the replicability of the method employed in this study.

With the above in mind, the scoring for the various metrics is applied as follows:

3.3.3.2 Local bond market assessment

This criterion is broken down into 7 metrics. Each metric earns a score from 1 – 3. From the individual scores achieved, an average score is then calculated, rounded to the nearest whole number to provide an overall score for the local bond market assessment.

The metrics used and relative analysis are akin to the methodology applied by Maziad et al. (2013) in their International Monetary Fund ("IMF") analysis of local currency bond markets. However, a difference is that Maziad et al. (2013) did not provide a numeric score as a rating, but rather a description, such as developed or underdeveloped.

The importance assigned to local currency bonds in this analysis aligns with the importance ascribed to local currency bonds by Hashimoto et al. (2021) in their assessment for the World Bank and IMF on developing local currency bond markets.

Note: it was not possible to obtain sufficient information on the holders of the bonds in countries, as described in Section 4.2, so this has not been considered. With this in mind, the metrics reviewed and scoring system applied in the local bond market analysis is described in Table 7, with the premise being that the deeper and wider the local bond market, the higher it scores in the MJFW.

Table 7: Local bond market metrics and scoring system

Metric	Unit	Scoring system
Number of active bonds	# of bonds	Ratio of larger value divided by smaller value, rounded to the closest whole number [1, 2 or 3]
Number in local currency	# of bonds	Ratio of larger value divided by smaller value, rounded to the closest whole number [1, 2 or 3]
% in local currency	%	80% <= | 3 points 60% > 80% | 2 points <= 60% | 1 point
Value of active bonds	USD billions	Ratio of larger value divided by smaller value, rounded to the closest whole number [1, 2 or 3]
Number of issuers	# of issuers	Ratio of larger value divided by smaller value, rounded to the closest whole number [1, 2 or 3]
Number of currencies	# of currencies	Ratio of larger value divided by smaller value, rounded to the closest whole number [1, 2 or 3]
% in USD	%	20% >= | 3 points 20% < 40% | 2 points >= 40% | 1 point

Source: Candidate summary based on data from Bloomberg (2024)

3.3.3.3 Policy guidelines and government support

The relevant legislation and government support undertakings were read and summarised. The policies were compared to the GBP and CBS. Closer alignment between international best practice and local legislation scores higher than divergent policies. 2 points are awarded for strong alignment between international and local standards, and 1 point is award for some but not strong alignment. A further point is available if tangible government support is demonstrated. This is the most subjective of the scoring criteria.

3.3.3.4 Certification

The certification criterion considers the entities that are listed as the certifiers of the GBs. It assesses where they have a presence per the certifier's own website. If 80% or more of the certifiers are locally based (i.e. have an office in SA or Nigeria), a score of 3 is achieved. If between 60% and 80% of the certifiers are locally based, a score of 2 is achieved. If 60% or fewer of the certifiers are locally based, a score of 1 is achieved.

3.3.3.5 Public versus private participation

Jain et al. (2022) rate this metric more highly when greater private participation is included, but this study considered the balance between public and private listings – favouring private listings but requiring a base of government listings to add credibility to the market in its nascent stages, as suggested by Duru & Nyong (2016) and Magale (2021). For this scoring system, a single point is awarded if the level of government involvement is 10% of the total issuances or more. For the 2 other points, 1 point is awarded if the private sector involvement makes up more than 60% of the issuances, and 2 points are awarded if the private sector makes up more than 80% of the issuances.

3.3.3.6 Green bond diversification

As with the local bond market assessment, this criterion is broken down into 5 distinct metrics, with each metric attracting a score of 1 - 3. From the individual scores, an average score is calculated and rounded to the nearest whole number to provide an overall score for the local GB market assessment.

This criterion considers the number of currencies, number of years of issuance of GBs, number of distinct entities and entity types that list GBs, as well as the number of exchanges on which the GBs are listed. Greater diversity is ranked more highly than lower diversity. The metrics were obtained from the Bloomberg database. The scoring approach is described in Table 8.

Table 8: Metrics and scoring system for the GB diversification element of the MJFW

Metric	Unit	Description	Scoring system
Number of years of issuance	# of years	The number of distinct years in which GBs were issued that list the country in question as the country of risk	Ratio of larger value divided by smaller value, rounded to the closest whole number [1, 2 or 3]
Number of issuers	# of issuers	The number of distinct issuers of GBs. Group companies are grouped together as a single issuer	Ratio of larger value divided by smaller value, rounded to the closest whole number [1, 2 or 3]
Number of types of issuers	# of types of issuers	The Bloomberg database assigns a type of company to each issuer. This is taken from that categorisation	Ratio of larger value divided by smaller value, rounded to the closest whole number [1, 2 or 3]
Number of currencies listed	# of currencies of GBS	Number of currencies of GBs that list the country in question as the country of risk	Ratio of larger value divided by smaller value, rounded to the closest whole number [1, 2 or 3]
Number of exchanges listed on	# of exchanges listed on	# of exchanges that list assets in the country in question as the country of risk	Ratio of larger value divided by smaller value, rounded to the closest whole number [1, 2 or 3]

Source: Candidate summary based on data from Bloomberg (2024)

3.3.4 Limitations of the study

Given the relatively small number of labelled GBs listed in Africa, the scope of this study is not very wide. In addition, comparing 48 SA GBs to 6 Nigerian GBs also limits the inferences that can be extracted from the comparison given the disproportionate figures. Future studies may provide a broader and more robust analysis by considering unlisted and unlabelled African GBs (data permitting) and by conducting increased analyses based on the value in addition to the number of GBs studied.

The scoring mythology developed by Jain et al. (2022) in the JFW is a form of self-review. This is a limitation of the JFW, and by extension the MJFW. In addition, given that the scoring system is relative based on the countries being analysed, future studies may compare these GBMSs to non-African ones to gain a sense of how the leading African GBMSs compare on a global scale. Comparisons could be made to developed markets and non-African developing markets too. The scoring system may also limit nuanced analysis given that only ratings of 1 – 3 are applied. Future studies may consider building on this scoring system and increasing the

score per criteria to allow for a more nuanced analysis, particularly if more countries are added to the comparison.

A further enhancement could be made by determining a completely objective means of comparing the regulatory environments of the countries and levels of government support. This may be aided by conducting primary interviews with relevant industry players to triangulate a method of increasing the reliability and validity of the scoring metrics.

Chapter 4: Discussion of Findings

4.1 Introduction

This chapter presents a comparative analysis of the GBMSs in SA and Nigeria using the MJFW. The scoring methodology used in the MJFW provides a structured comparison, enabling an evaluation of each market's relative performance. The analysis explores five dimensions: the local bond market, policy guidelines and levels of government support, certification practices, public versus private sector participation, and GB diversification. Each metric is evaluated to assess its contribution to the development and effectiveness of the respective GBMS. By examining these dimensions, the chapter highlights the strengths and limitations of both GBMSs.

SA's GBMS demonstrates greater maturity, characterised by a deeper local bond market, strong regulatory alignment with international best practices, and more significant private sector involvement. Conversely, Nigeria's GBMS, while smaller in scale, reflects a more proportional public-private participation and reasonable alignment regulatory alignment, at least on paper. With a total score of 13 for SA and 7 for Nigeria, the findings underscore SA's leadership in Africa's GB market development while identifying areas for improvement in both countries.

4.2 Local bond market assessment

As described in Chapter 3, the breadth and depth of a local bond market in a country is expected to have a bearing on its GBMS. The information presented in Table 9 is sourced from Bloomberg and includes the active (currently outstanding) bonds as at December 2024. Historic bonds were excluded to prevent the age of the stock market from skewing the comparison. The information presented does not include an analysis of who owns bonds in the country, as sufficient information was not available: information on the holders of SA bonds was available for 22.39% of the active bonds, and for Nigeria, this proportion was even lower at 13.30% (Bloomberg, 2024). There was a similar lack of information on the owners of GBs in each country, as described in Section 4.6.

Table 9 shows that SA has approximately 6 times as many active bonds as Nigeria and approximately 4 times the value of active bonds. The proportionate difference for both of these metrics is lower than the proportionate difference in their GBs. Figure 3 shows that SA has 8 times more GBs than Nigeria, which suggests that GBs are a proportionately smaller part of the

total bond market in Nigeria than in SA. The bond markets in both countries are predominantly in local currency - both have more than 91% of their bonds listed in their local currencies. Interestingly, while SA has approximately 6 times as many bonds as Nigeria, it only has approximately twice as many issuers of bonds. SA also lists more foreign currencies in its market and is less reliant on USD issuances.

Given the large difference between the two markets by value and by number of instruments, and as presented in Table 9 SA scores a 3, while Nigeria scores a 1 for this metric.

Table 9: Descriptive metrics of the active SA and Nigerian local bond markets as at December 2024

Metric	Unit	SA	Nigeria	Ratio SA: Nigeria	SA Score	Nigeria Score
Number of active bonds	# of bonds	2,670	481	5.55	3	1
Number in local currency	# of bonds	2,445	438	5.58	3	1
% in local currency	%	91.6	91.1	1.01	3	3
Value of active bonds	USD billions	599	156	3.84	3	1
Number of issuers [1]	# of issuers	83	42	1.98	2	1
Number of currencies	# of currencies	13	4	3.25	3	1
% in USD	%	5.4	8.1	n/a	n/a	n/a
Average score					2.83	1.33
Average score (rounded)					**3**	**1**

Candidate estimates based on data from Bloomberg (2024)

[1] Note, issuers were grouped together into common entities to avoid overstating the number of active bond issuers in the country. For example, in SA, Bloomberg lists Absa Bank Ltd and Absa Group Ltd as two separate issuers, but this was combined into a single Absa Bank issuer for the purpose of this analysis. The same was done for Nigeria, where the Union Bank of Africa and Union Bank of Nigeria are grouped together.

4.3 Policy guidelines and government support

This metric provides an overview of the regulatory environment and government support in each country. The score is higher for clear legislation that aligns with international best practice, and for greater levels of government support that ease the path to issuing GBs in the country in question. These are discussed in more detail in Sections 2.4.5 - 2.4.7.

4.3.1 Policy guidelines

With the JSE actively overseeing GB issuances, SA has a more centralised and structured regulatory environment than Nigeria. The JSE's requirements, including mandatory certification, ensure that issuers adhere to international best practices, including external verification and continuous disclosure. The JSE Debt Listing Requirements and SAGFT align explicitly with both the GBP and the CBS. This gives SA a score of 2 out of 2 for this criterion

Nigeria, while having multiple regulatory bodies (e.g., the Nigerian SEC and Ministry of Environment), lacks a single supervisory authority to enforce compliance effectively. The Green Bond Secretariat exists to oversee Nigeria's GB market, but gaps in impact reporting and monitoring have been noted. Nigeria's framework incorporates elements of both the GBP and CBS but lacks direct integration. Nigeria's approach, while aligned in principle, faces challenges in enforcement, reporting consistency, and market uptake. For this reason, Nigeria scores a 1. It has relative alignment in theory, but the application is inconsistent.

4.3.2 Government support

SA has dedicated funding mechanisms, such as the Green Fund, which provides catalytic funding to green projects. While the Green Fund has been effective, its limited capital base constrains the scale of support it can provide. In addition, the absence of direct tax incentives or risk-sharing mechanisms for private sector issuers limits broader market participation. Despite this, SA scores 1 for its tangible government support via the Green Fund.

Nigeria's practical support mechanisms remain limited compared to SA's. While the sovereign GBs have successfully mobilised capital for public projects, there are only a small number of issuances, and there are limited targeted interventions - such as subsidies, available funding, tax incentives, or risk-sharing mechanisms - to encourage private sector issuances. Nigeria loses the point for government support, as there have been no government issuances for several years and no other practical support is available. It therefore scores 0 for this metric.

4.3.3 Total

Overall, SA scores 2 for its strongly aligned policies and 1 for its tangible government support via the green fund, giving it a total score of 3. Nigeria scores 1 for its somewhat aligned framework (taking the application difficulties into account) and 0 for government support, as there have been no government issuances for several years and no other practical support is available. This gives Nigeria a total score of 1.

4.4 Certification

This metric focusses on the certifiers of the labelled GBs in each country. It assessed who the certifiers are (where that information is available), and where they operate. A certifier having a local office is considered favourably, with a higher score awarded when a greater proportion of certifiers are locally based.

Of SA's 48 listed GBs, 33 (68.75%) are certified by issuers with offices in the country. This is higher than Nigeria's 1 (16.67%). The remaining SA GBs are certified by international service providers, and information on the certifier of 1 bond was not available (Bloomberg, 2024). Of the Nigerian GBs, information on the certifier was not available on Bloomberg for 3 (50%) of them, compared to 1 (2.08%) for SA, and 2 were certified by international companies. In Nigeria, all the certifiers identified have offices in the UK and on 6 continents (excluding Antarctica), suggesting they are all large international players. In SA, the international certifiers with an equivalent footprint all have offices in SA. The international entities without offices in SA have slightly smaller footprints, typically with exposure on 5 continents, or only to Europe. This indicates that GBs in SA can be certified by smaller players and that there are more local options.

Based on the scoring presented in Table 10, SA scores 2 for falling within the 60% - 80% threshold (there are still a third of its GBs certified by external parties or not disclosed), while Nigeria scores 1 as over 80% of its GBs are not disclosed or not locally certified, which puts it well below the 60% threshold (see Table 11).

Table 10: South African GB certifiers

#	GB External Reviewer	EUR	NOK	USD	ZAR	Total	SA Office?	Foreign offices
1	Carbon Trust (Carbon Trust, 2024)				8	**8**	Yes, Johannesburg	Asia, Europe, North America, UK
2	Cicero (Cicero, 2024)	1	2			**3**	No	Europe
3	Climate Bonds Initiative (CBI, 2024b)				1	**1**	No	Asia, Australasia, Europe, South America, UK
4	DNV (DNV, 2024)		2			**2**	Yes, Cape Town, Durban, Johannesburg	Africa, Asia, Australasia, Europe, North America, South America, UK
5	IBIS ESG Consulting Africa (Ibis Consulting, 2024)				5	**5**	Yes, Cape Town, Johannesburg	Africa, Asia, Europe
6	KPMG (KPMG, 2024)				6	**6**	Yes, Various	Africa, Asia, Australasia, Europe, North America, South America, UK
7	Moody's Corporation (Moody’s, 2024)				1	**1**	Yes, Johannesburg	Africa, Asia, Australasia, Europe, North America, South America, UK
8	S&P Global (S&P, 2024)				11	**11**	Yes, Cape Town, Johannesburg, Pretoria	Africa, Asia, Australasia, Europe, North America, South America, UK

9	Sustainalytics BV (Sustainalytics, 2024)			1	9	**10**	No	Asia, Australasia, Europe, North America
10	Not disclosed				1	**1**	N/A	N/A
Total GB Issued							**48**	**100.00%**
GBs certified by parries with local offices							**33**	**68.75%**

Candidate estimates based on data from Bloomberg (2024) and described companies' websites

Table 11: Nigerian GB certifiers

#	External Reviewer	NGN	USD	Total	Nigeria Office?	Foreign offices
1	DNV (DNV, 2024)	1		**1**	Yes, Port Harcourt	Africa, Asia, Australasia, Europe, North America, South America, UK
2	Moody's Corporation (Moody's, 2024)	1		**1**	No	Africa, Asia, Australasia, Europe, North America, South America, UK
3	S&P Global (S&P, 2024)		1	**1**	No	Africa, Asia, Australasia, Europe, North America, South America, UK
4	Not Disclosed	3		**3**	N/A	N/A
Total GB Issued					**6**	**100.00%**
GBs certified by parries with local offices					**1**	**16.67%**

Candidate estimates based on data from Bloomberg (2024) and described companies' websites

4.5 Public versus private participation

This metric considers the level of private and public issuances of GBs in each country. Overall, it is accepted that GBs should be a means to crowd private capital into a market, with the result that the scoring is biased towards a higher-level private issuance. However, given the importance of public leadership, the number and proportion of public issuances will also influence the score that is awarded to each country.

Table 12: SA and Nigerian split between private and public sector GB issuances

Metric	Unit	Private issuances	Government issuances	Associated score
South Africa	# of bonds issued	46	2	n/a
	% of bonds issued	**95.83%**	**4.17%**	**2 + 0 = 2**
Nigeria	# of bonds issued	4	2	n/a
	% of bonds issued	**66.67%**	**33.33%**	**1 + 1 = 2**

Source: Candidate estimates from data extracted from Bloomberg (2024)

At face value, Nigeria demonstrates a greater balance between public and private issuances given its 67% / 33% split. This contrasts markedly to SA's 96% / 4% split. However, Nigeria has the same number of public issuances as SA does (albeit that Nigeria's public issuances are by the national government whereas SA's are by local governments). SA scores higher for private sector involvement given that the private sector issuances far outstrip the public ones. This has been achieved with the same number of public issuances as Nigeria, suggesting that the SA GBMS is a more effective source of private sector capital. SA, however, could be penalised for a lack of government leadership in the sector, while proportionately, Nigeria shows stronger government involvement. A potential factor in SA's favour that was not considered due to the lack of information, as described in Section 4.6 below, is investment by government initiatives such as the Green Fund into SA's GBs.

Overall, SA scores 2 for having 96% private sector involvement and loses the third point for lack of government involvement. Nigeria scores 2 in this instance due to its 33% government involvement (1 point) and 67% private sector involvement (1 point).

4.6 Green bond diversification

This metric investigates the number of years in which GBs have been issued in each country, the number and type of issuers, the number of currencies listed for GBs as well as where all the GBs listing SA and Nigeria as the country of risk are listed. As with the local bond market described under Section 4.2 above, there is a shortage of information on Bloomberg on the holders of Nigerian and SA GBs. For SA, information is available for 31.66% of the value of the GBs listed, and for Nigeria, this is approximately half of the SA proportionate availability (Bloomberg, 2024). For this reason, the holders of the GBs were not considered in the analysis.

Scores are higher if there is a greater number of issuers and more issuer type diversity. Given that the assets benefiting from the funding are based in the country in question, the number of exchanges and number of currencies are also positively corelated with the score, as they speak to increased sources of funding for local assets.

The Figures referred to in this section are in Appendix 1 for SA and Appendix 2 for Nigeria.

4.6.1 South Africa

Figure 9 shows that SA has had GBs listed in all but 1 of the past 11 years. The number of issued GBs has been higher in recent years, although 2024, with 9 GBs, lags behind 2022 and 2023, where issuances peaked at 12 GBs in each year. This is a trend that could be monitored to determine if it is a one-off drop, or if GBs are becoming less attractive in the country. It is worth noting despite this that 2024 is still the year with the third most GBs listed in the country.

SA effectively has 10 issuers of its 48 GBs. As with the local bond market analysis, issuers in the same group of companies were combined – for example, Nedbank Ltd and Nedbank Group Ltd were combined into Nedbank. Similar combinations occurred for the other banks, and the Cities of Johannesburg and Cape Town were grouped together under Local Government.

Figure 11 shows that the issuers are grouped into 4 types, with banks and real estate companies being the largest categories. Interestingly, despite the growing renewable energy sector in SA, the only utility to issue GBs is the Norwegian headquartered Scatec, and their GBs have all been listed in Oslo. It could be an area of further study to understand why other SA utilities have not made use of this avenue of financing or refinancing.

Overall, the relatively few issuers and types of issuers in the SA GB market suggest the market is narrow and concentrated, and that there is not a large take up of GBs by issuers in the market.

However, given there are 10 issuers of GBs (Figure 10) and 83 issuers of all bonds in the SA market (Table 9), it suggests that issuers of existing bonds are also the issuers of GBs, which brings into question the additionality benefit of the GBs in the country.

While assets based in SA command mostly ZAR denominated funds - as shown in Figure 12 - there is an appetite for other currencies. Scatec accounts for 5 out of the 6 foreign currency bonds, having listed all the NOK GBs on the OSE and the EUR denominated GB on both the OSE and the FWB. The USD bond was listed by Standard Bank on the LSE. These account for all the non-ZAR bonds shown in Figure 12, and the majority of non JSE bonds shown in Figure 13. However, there is an interesting outlier - Redefine Properties listed a ZAR denominated GB on the NGX. The rest of the GBs shown in Figure 12 (42 GBs) are ZAR denominated and, Figure 13 (41 GBs), listed on the JSE. This highlights that in the SA market, most GBs are locally listed and are denominated in the local currency.

4.6.2 Nigeria

Figure 14 shows that all 6 of Nigeria's GBs were listed in different years, except for 2019, in which 2 GBs were listed. The others were listed in 2017, and in each year from 2020 to 2022. Interestingly, no GBs have been listed in the past 2 years.

Figure 15 and 16 show 3 equal parallel lines - there are 3 issuers of GBs in Nigeria, each a different type of issuer, and each having issued 2 GBs. While the types of GB issuers show a degree of variety, being 75% of the types of issuers observed in SA, having only 3 issuers of GBs in total shows relatively little diversity in the Nigerian GB market.

As in SA, the majority of the Nigerian GBs listed on the local stock exchange and are listed in the local currency, being the NGX and NGN respectively. This explains 5 out of the 6 GBs shown in Figure 17 and Figure 18. The outlier in both charts is a USD denominated GB listed by Access Bank on the LSE. Nigeria mirrors SA here in that each country has a bank-listed, USD denominated GB on the LSE. While there are relatively few GBs in Nigeria, it is promising that they are able to list GBs in the local currency on the local stock exchange.

4.6.3 Comparison of South Africa and Nigeria

Table 13 below summarises the scores allocated to the metrics discussed in this criterion. Overall, SA scores 3, while Nigeria scores 1. However, both markets could benefit from expanding their issuer bases.

Table 13: Summary of GB diversity of SA and Nigeria per the MJFW

Metric	Unit	SA	Nigeria	Ratio SA: Nigeria	SA Score	Nigeria Score
Number of years of issuance	# of years	10	5	2.00	2	1
Number of issuers	# of issuers	10	3	3.33	3	1
Number of types of issuers	# of types of issuers	4	3	1.33	3	2
Number of currencies listed	# of currencies of GBS	4	2	2	2	1
Number of exchanges listed on	# of exchanges listed on	5	2	2.5	3	1
Average score					2.60	1.20
Average score (rounded)					**3**	**1**

Candidate estimates based on data from Bloomberg (2024)

4.7 Summary

4.7.1 Overview

While the JFW requires some modifications in order to be more applicable in an African context, it forms a solid foundation for the analysis of a GBMS. The MJFW expands on the JFW and demonstrates that SA GBMS is considerably stronger than the Nigerian one. This is in keeping with the empirically observed difference in GB roll out in each country.

By applying the MJFW, this study evaluates the relative strengths and weaknesses of each country's GBMS across five key metrics: local bond market depth, policy guidelines and government support, certification practices, public versus private sector participation, and GB diversification.

Table 14 shows a summary of the analysis conducted above, while Table 15 summarises the scores received for each country’s GBMS under the MJFW, with SA achieving a total score of 13 and Nigeria scoring 7, reinforcing the empirical evidence that SA’s GBMS is more developed than Nigeria’s. These results also evidence the utility and applicability of the MJFW in evaluating and comparing the GBMSs of SA and Nigeria. The analysis demonstrates that the MJFW can serve as a tool for stakeholders to assess a GBMS.

4.7.2 Summary of analysis

Table 14: Summary of findings when applying the MJFW to SA and Nigeria

Metric	South Africa	Nigeria
Local bond market	SA has a relatively deep and wide local bond market, with 2,670 active instruments listed with a cumulative value of US$ 599 billion.	Nigeria has a comparatively concentrated local bond market with 481 active instruments and a cumulative value of US$ 156 billion.
Policy guidelines and government support	SA demonstrates strong alignment with the CBS and GBP on both the JSE and legislative levels. Government support mechanisms, such as the Green Fund demonstrate government support for GBs.	Nigeria's legislative policies and the NGX's requirements also show alignment with the GBP and CBS. However, there is limited government support available and there are questions over the integrity of the GB policies applied in Nigeria and their follow through on theory versus reality.
Certification	Two thirds of SA's GBs are certified by parties with local offices. The remainder are certified by international players, although these players tend to have slightly smaller footprints that the Nigerian verifiers do.	Only 17% of Nigerians GBs are certified by parties with local offices. The remainder are not disclosed or are certified by very large international players.
Public versus private participation	46 out of SA's 48 GBs, or 96%, are issued by private parties. The other 2 are listed by local government entities. SA scores highly on private sector involvement, and poorly on government leadership.	Nigeria has 2 out 6 GBs listed by the national government, and the remaining 4 (or two thirds) listed by private entities. Proportionately, the government leadership is strong, but it loses a point for a lack of private sector involvement.
GB diversification	SA has a longer time horizon of issuances and more consistent issuances. It has more issuers and a greater mix of currencies and exchanges while still being dominated by local currency and local issuances	Nigeria is limited by only having 6 listed GBs. While there is a proportionate mix across metrics, with a relative diversity of issuance years, issuers, currencies and countries of issue, the limited number of GBs does reduce Nigeria's score relative to SA.

Candidate summary from Chapter 4

4.7.3 Total scores

Table 15: SA and Nigeria scores in the MJFW

Metric	South Africa	Nigeria
Local bond market	3	1
Policy guidelines and government support	3	2
Certification	2	1
Public versus private participation	2	2
GB diversification	3	1
Total	**13**	**7**

Candidate summary from Chapter 4

Chapter 5: Conclusions and Recommendations

5.1 Introduction

GBs present a significant opportunity for mobilising capital for sustainable development in Africa. This dissertation highlights the strengths, weaknesses, and potential avenues for strengthening the GBMSs of SA and Nigeria. While SA leads in market maturity and regulatory robustness, Nigeria's active government involvement presents a foundation for future growth. By implementing targeted policy interventions and market reforms, both countries can enhance their GBMSs, fostering greater investor confidence and accelerating the transition to sustainable finance in Africa.

5.2 Summary

This dissertation set out to analyse and compare the GBMSs of SA and Nigeria using the MJFW. The study aimed to evaluate the maturity, effectiveness, and potential areas for development in both markets, providing a structured analysis across five key metrics: local bond market depth; policy guidelines and government support; availability of local certification; public versus private participation; and GB diversification. The findings demonstrate that SA's GBMS is relatively more developed, as it achieved a total score of 13 out of 15 while Nigeria's exhibits potential for growth but faces limitations, as shown by its score of 7 out of 15.

The comparative analysis indicated that SA benefits from a relatively deep and liquid local bond market, robust regulatory frameworks aligned with international standards, and a strong presence of private sector issuers. However, SA's GBMS is constrained by limited government leadership in GB issuances. Conversely, Nigeria, despite its smaller-scale GB market, demonstrated a relatively balanced mix of public and private issuers, and the government has played a more active role in promoting GBs. However, Nigeria's market is hindered by weak certification practices, a lack of issuer diversity, and a comparatively shallow bond market.

This dissertation contributes to the existing body of knowledge by offering the first formal analysis of the GBMSs of SA and Nigeria. It described the MJFW as the basis of this analysis. By identifying specific strengths and weaknesses in SA and Nigeria's GB markets, the study provides insights for policymakers, investors, and issuers. It underscores the importance of regulatory clarity, government involvement, and diversified market structures in fostering a

robust GB market. Furthermore, the findings offer practical implications for stakeholders seeking to enhance GB adoption in Nigeria and SA. Governments can use this analysis to refine policy strategies, while investors and issuers can gain a clearer understanding of market conditions and investment opportunities.

5.3 Recommendations

The study found that SA has a more mature GBMS, with greater market depth, higher private sector involvement, and strong regulatory alignment with global standards. Nigeria, on the other hand, has a more nascent GBMS, with fewer issuances, a greater reliance on government-led initiatives, and challenges related to certification and market participation. The research demonstrated that SA's regulatory environment is more structured and investor-friendly, benefiting from the JSE's Debt Listing Requirements and the SAGFT. Nigeria has a well-defined regulatory framework through the NGX and government-led GB programmes; however, it lacks robust enforcement and transparency mechanisms. Barriers identified include limited government participation in SA and weak market depth and certification practices in Nigeria. Opportunities exist for both countries to introduce targeted incentives, such as tax benefits and credit enhancements, to attract greater investment in GBs.

5.3.1.1 Recommendations: South Africa

Increase government participation: The SA government should actively issue sovereign GBs to set benchmarks for the market and enhance investor confidence.

Introduce tax incentives: Providing tax relief on GB interest income and offering reduced corporate tax rates for GB issuers could lower capital costs and promote market expansion.

Enhance public-private partnerships (PPPs): Government-backed projects in infrastructure, renewable energy, and climate resilience could leverage PPPs to attract private investment.

Expand issuer diversity: Encouraging non-financial corporations and smaller entities to enter the GB market can improve diversification and accessibility.

5.3.1.2 Recommendations: Nigeria

Improve certification practices: Enhancing local certification capabilities and aligning standards with international best practices would increase market credibility and investor trust.

Expand government support mechanisms: Establishing credit enhancement facilities, such as partial guarantees and first-loss tranches, could mitigate risks and attract private investors.

Encourage broader market participation: Financial and regulatory incentives, such as reduced listing fees and tax breaks, could encourage a wider range of issuers, including private companies and municipal governments.

Strengthen post-issuance reporting: Implementing stringent reporting requirements on fund allocation and environmental impact would improve transparency and market integrity.

5.4 Avenues for future research

The findings of this study are subject to some limitations. First, the research focused on SA and Nigeria, the two largest GB markets in Africa. While their selection was justified, the exclusion of other African countries limits the generalisability of the findings.

Second, data constraints posed challenges in fully assessing some metrics. For example, the limited availability of detailed data on bond ownership and certification practices restricted insights into investor dynamics and market processes. The JFW also contains elements of self-review, which could be enhanced and the scoring metrics themselves explored in further detail to drill down into a more objective and replicable scoring system.

Future research could address these limitations by expanding the geographic scope of the MJFW to other African countries with emerging GB markets, such as Kenya, Namibia, and Egypt. This would provide a broader perspective on the state of green finance on the continent. Comparative analyses of African GBMSs with those in other emerging markets, such as Southeast Asia or Latin America, could also offer valuable insights into best practices and transferable strategies, and provide context for Africa's performance versus its peers. The same could be done in comparison to developed markets to determine how African countries compare on an international scale. Additionally, investigating the role of unlisted GBs and private placements could provide a more holistic understanding of green finance activity in Africa. Another promising avenue for future research is to explore the environmental and social impacts of GBs, assessing how effectively these instruments achieve their stated objectives, as well an investigating and explaining GB issuance trends in African countries.

A possible addition to the MJFW could be the inclusion of mandated regulatory requirements – in terms of legislated carbon offset and ESG requirements (referring to national requirements for green compliance rather than GB specific policy).

A possible methodological enhancement could include conducting interviews with various industry stakeholders to inform the scores and scoring methodology, specifically in the policy guidelines and government support section of the framework.

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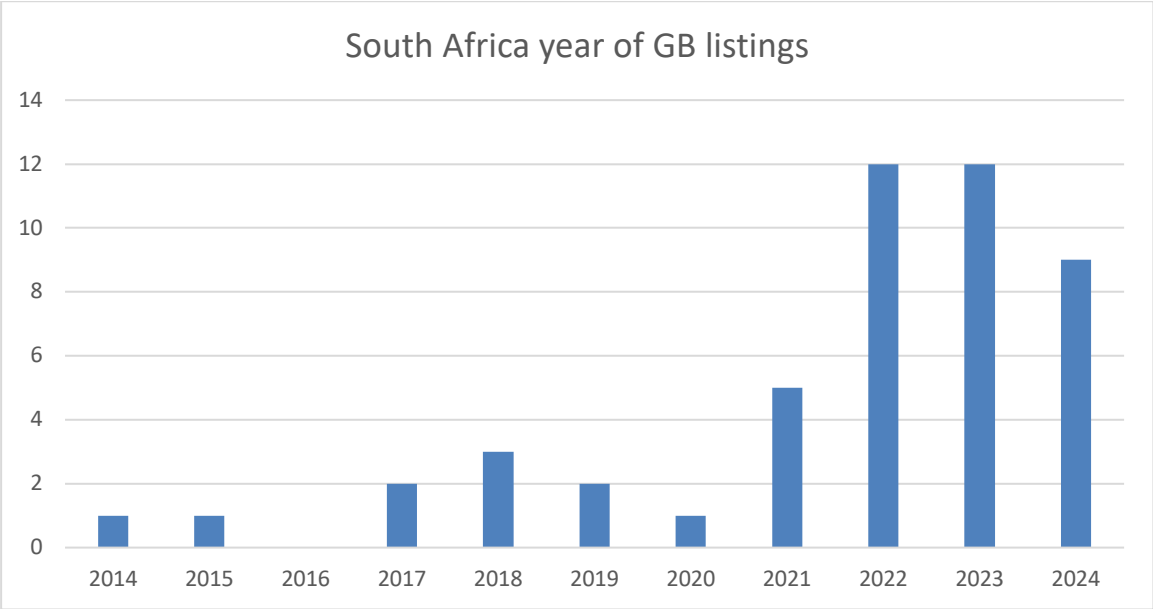
Appendices

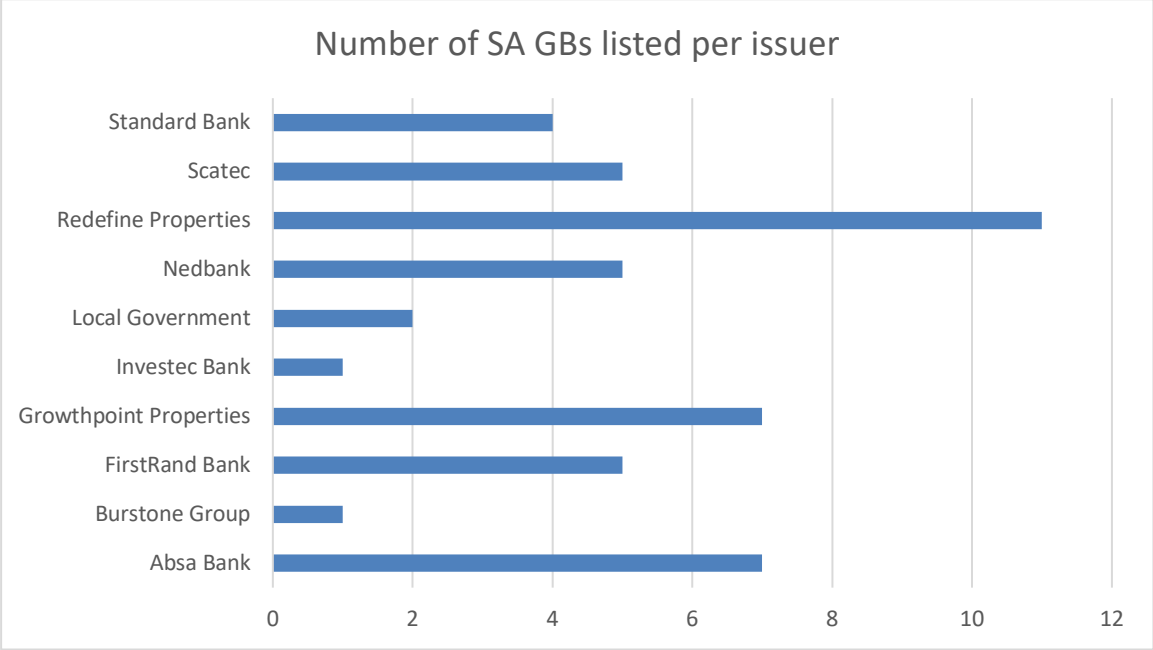
Appendix 1: South African green bond diversification

Figure 9: Years of SA GB issuances



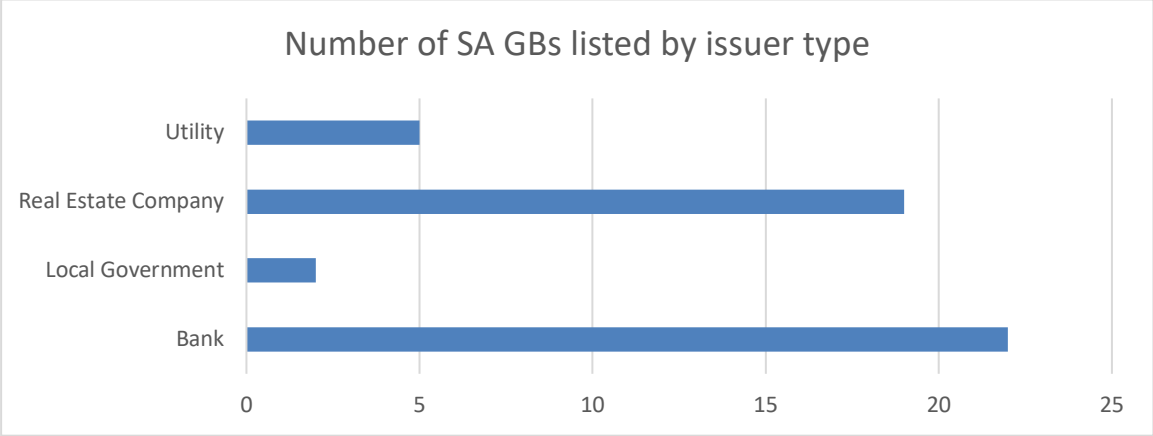
Source: Candidate estimate based on data from Bloomberg (2024)

Figure 10: Issuers of SA GBs



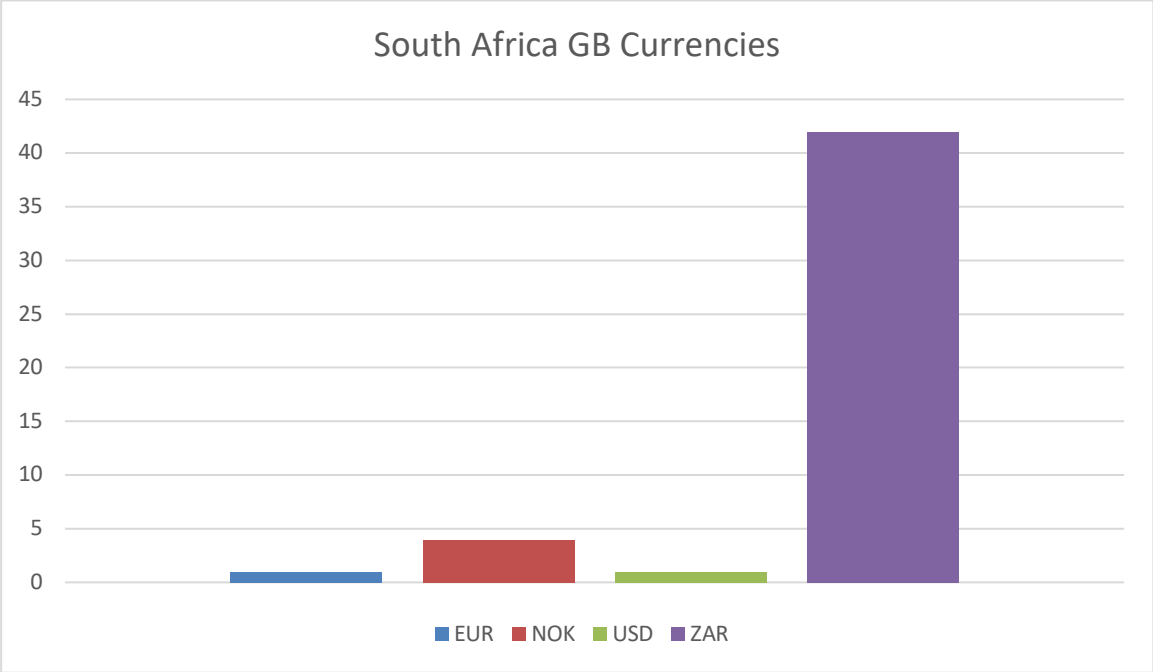
Source: Candidate estimate based on data from Bloomberg (2024)

Figure 11: Number of listed GBs in SA by issuer type



Source: Candidate estimate based on data from Bloomberg (2024)

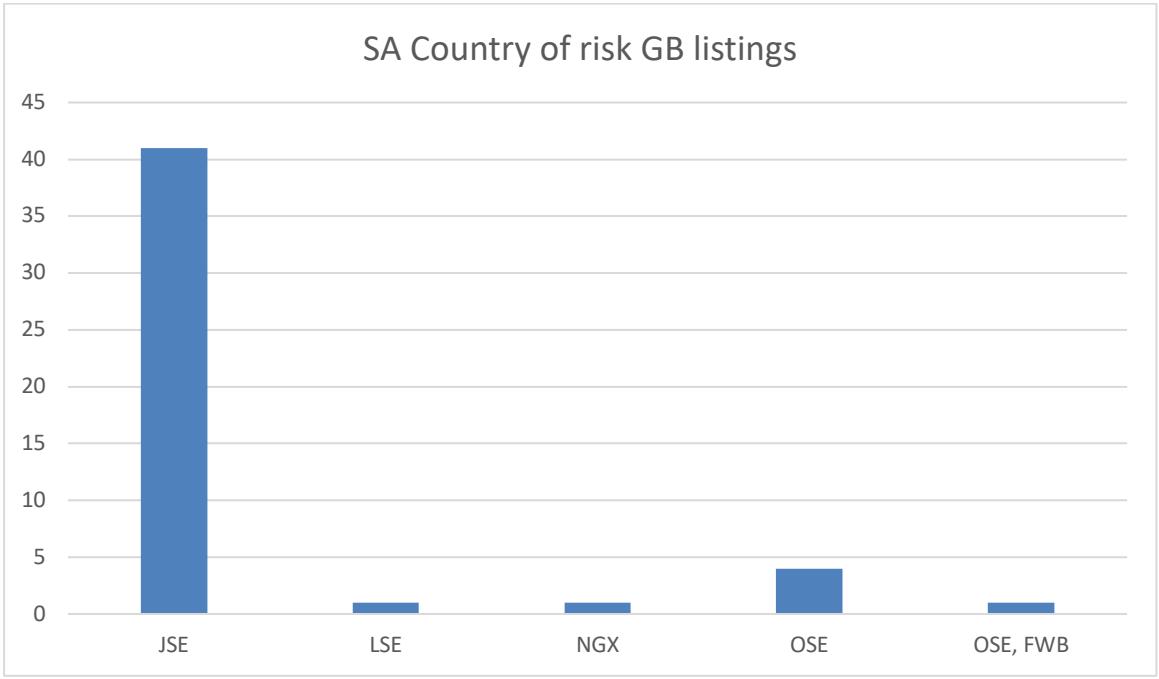
Figure 12: SA listed and labelled GBs by currency of issue



Source: Candidate estimate based on data from Bloomberg (2024)

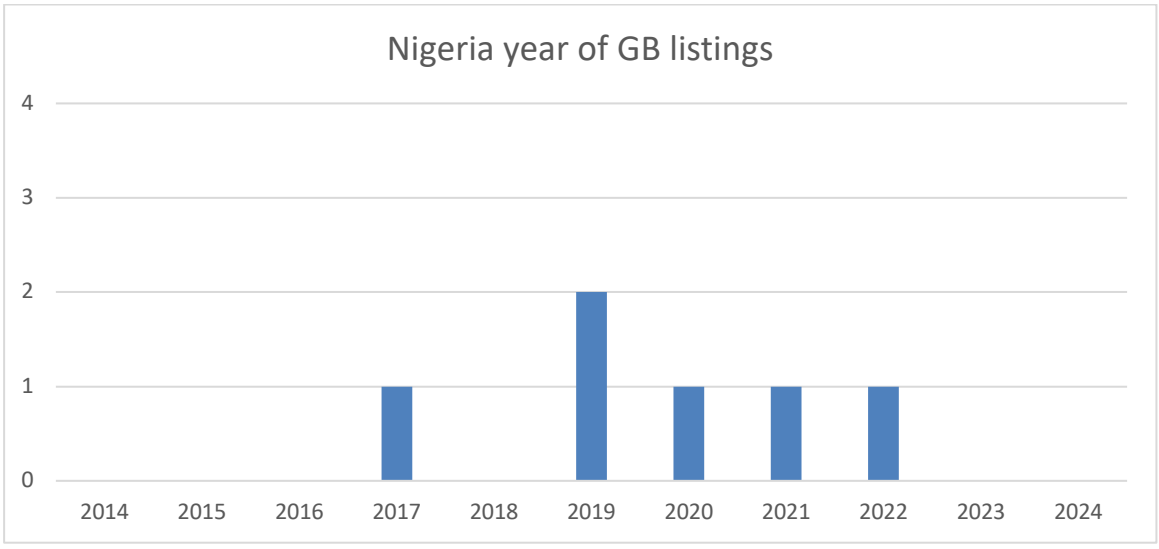
Appendix 2: Nigeria green bond diversification

Figure 13: Exchange of listing for GBs that list SA as the country of risk for the asset being raised against



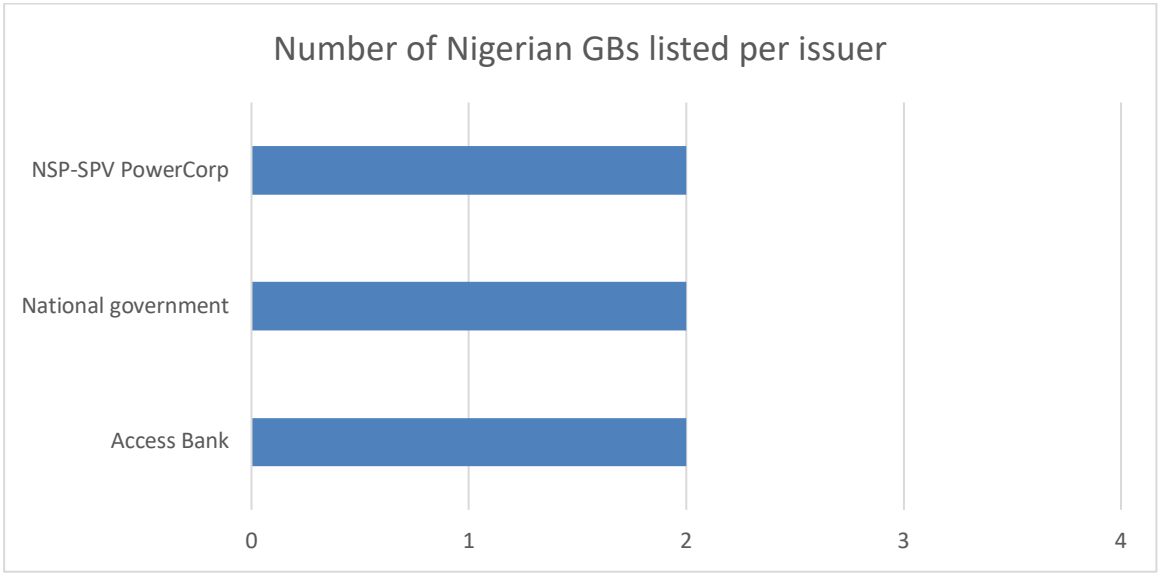
Candidate estimates based on data from Bloomberg (2024)

Figure 14: Years of Nigerian GB issuances



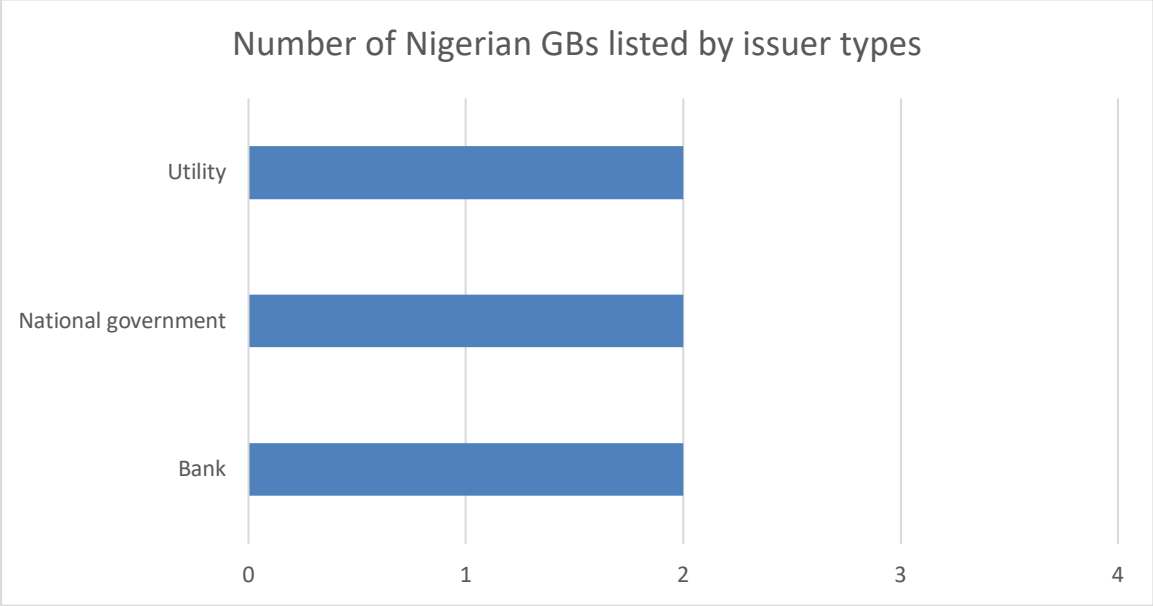
Candidate estimates based on data from Bloomberg (2024)

Figure 15: Issuers of Nigeran GBs



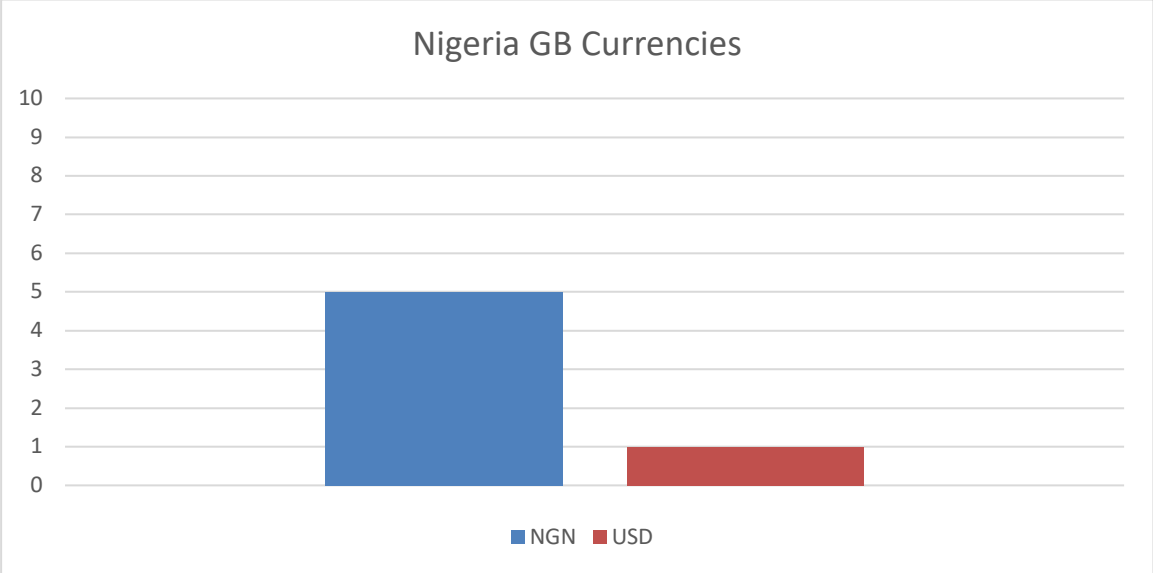
Candidate estimates based on data from Bloomberg (2024)

Figure 16: Number of listed GBs in Nigeria by issuer type



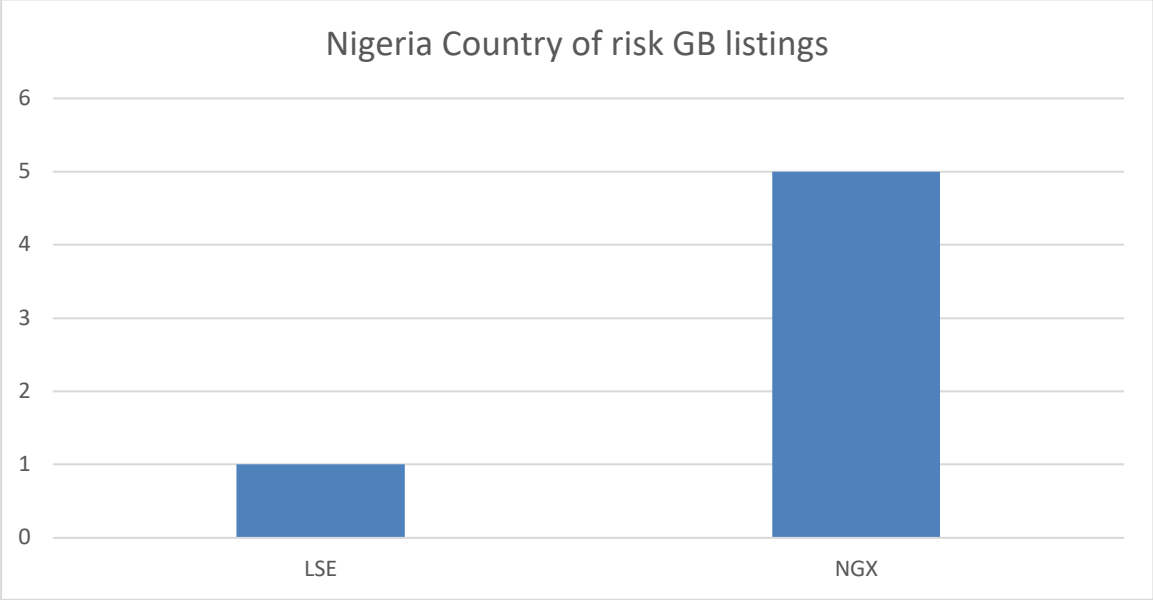
Candidate estimates based on data from Bloomberg (2024)

Figure 17: Nigeria listed and labelled GBs by currency of issue



Candidate estimates based on data from Bloomberg (2024)

Figure 18: Exchange of listing for GBs that list Nigeria as the country of risk for the asset being raised against



Candidate estimates based on data from Bloomberg (2024)

Appendix 3: Green bonds analysed

Table 16: List of South African and Nigerian GBs analysed

#	Issuer	Company	Ticker	Country of Risk	Maturity	Currency	Type of institution	Exchange	External reviewer
1	Absa Bank	Absa Bank Ltd	ASASJ	South Africa	2029/07/31	ZAR	Bank	JSE	IBIS ESG Consulting Africa
2	Absa Bank	Absa Bank Ltd	ASASJ	South Africa	2031/07/31	ZAR	Bank	JSE	IBIS ESG Consulting Africa
3	Absa Bank	Absa Group Ltd	ABGSJ	South Africa	2032/09/16	ZAR	Bank	JSE	Carbon Trust
4	Absa Bank	Absa Bank Ltd	ASASJ	South Africa	2027/06/27	ZAR	Bank	JSE	Carbon Trust
5	Absa Bank	Absa Group Ltd	ABGSJ	South Africa	2033/08/26	ZAR	Bank	JSE	Carbon Trust
6	Absa Bank	Absa Bank Ltd	ASASJ	South Africa	2025/06/27	ZAR	Bank	JSE	Carbon Trust
7	Absa Bank	Absa Bank Ltd	ASASJ	South Africa	2029/06/27	ZAR	Bank	JSE	Carbon Trust
8	Access Bank	Access Bank PLC	ACCESS	Nigeria	2027/05/03	USD	Bank	LSE	S&P Global
9	Access Bank	Access Bank PLC	ACCESS	Nigeria	2024/03/18	NGN	Bank	NGX	Not disclosed
10	Burstone Group	Burstone Group Ltd	IPFSJ	South Africa	2026/02/23	ZAR	Real estate company	JSE	IBIS ESG Consulting Africa
11	FirstRand Bank	FirstRand Bank Ltd	FSRSJ	South Africa	2030/10/12	ZAR	Bank	JSE	Sustainalytics BV
12	FirstRand Bank	FirstRand Bank Ltd	FSRSJ	South Africa	2029/05/16	ZAR	Bank	JSE	Sustainalytics BV

13	FirstRand Bank	FirstRand Bank Ltd	FSRSJ	South Africa	2027/05/16	ZAR	Bank	JSE	Sustainalytics BV
14	FirstRand Bank	FirstRand Bank Ltd	FSRSJ	South Africa	2031/05/16	ZAR	Bank	JSE	Sustainalytics BV
15	FirstRand Bank	FirstRand Bank Ltd	FSRSJ	South Africa	2028/10/12	ZAR	Bank	JSE	Sustainalytics BV
16	Growthpoint Properties	Growthpoint Properties Ltd	GRTSJ	South Africa	2028/03/09	ZAR	Real estate company	JSE	S&P Global
17	Growthpoint Properties	Growthpoint Properties Ltd	GRTSJ	South Africa	2025/03/09	ZAR	Real estate company	JSE	KPMG Services Pty Limited
18	Growthpoint Properties	Growthpoint Properties Ltd	GRTSJ	South Africa	2023/03/09	ZAR	Real estate company	JSE	KPMG Services Pty Limited
19	Growthpoint Properties	Growthpoint Properties Ltd	GRTSJ	South Africa	2029/06/14	ZAR	Real estate company	JSE	IBIS ESG Consulting Africa
20	Growthpoint Properties	Growthpoint Properties Ltd	GRTSJ	South Africa	2033/11/13	ZAR	Real estate company	JSE	IBIS ESG Consulting Africa
21	Growthpoint Properties	Growthpoint Properties Ltd	GRTSJ	South Africa	2032/12/14	ZAR	Real estate company	JSE	KPMG Services Pty Limited
22	Growthpoint Properties	Growthpoint Properties Ltd	GRTSJ	South Africa	2029/12/14	ZAR	Real estate company	JSE	KPMG Services Pty Limited
23	Investec Bank	Investec Bank Ltd	INTSJ	South Africa	2022/12/09	ZAR	Bank	JSE	Sustainalytics BV
24	Local Government	City of Cape Town South Africa	CAPTWN	South Africa	2027/07/17	ZAR	Local Government	JSE	KPMG Financial Services Inc
25	Local Government	City of Johannesburg South Africa	JOBURG	South Africa	2024/06/09	ZAR	Local Government	JSE	Not disclosed
26	National government	Nigeria Government Bond	NIGB	Nigeria	2026/06/13	NGN	National government	NGX	Moody's Corp

27	National government	Nigeria Government Bond	NIGB	Nigeria	2022/12/22	NGN	National government	NGX	DNV GL Group AS
28	Nedbank	Nedbank Ltd	NEDSJ	South Africa	2026/04/30	ZAR	Bank	JSE	S&P Global
29	Nedbank	Nedbank Ltd	NEDSJ	South Africa	2028/07/29	ZAR	Bank	JSE	Carbon Trust
30	Nedbank	Nedbank Ltd	NEDSJ	South Africa	2028/12/15	ZAR	Bank	JSE	Carbon Trust
31	Nedbank	Nedbank Ltd	NEDSJ	South Africa	2024/04/30	ZAR	Bank	JSE	Carbon Trust
32	Nedbank	Nedbank Group Ltd	NEDSJ	South Africa	2033/10/04	ZAR	Bank	JSE	S&P Global
33	NSP-SPV PowerCorp	NSP-SPV PowerCorp PLC	NSPSPV	Nigeria	2034/02/27	NGN	Utility	NGX	Not available
34	NSP-SPV PowerCorp	NSP-SPV PowerCorp PLC	NSPSPV	Nigeria	2031/04/15	NGN	Utility	NGX	Not available
35	Redefine Properties	Redefine Properties Ltd	RDFSJ	South Africa	2029/09/21	ZAR	Real estate company	JSE	S&P Global
36	Redefine Properties	Redefine Properties Ltd	RDFSJ	South Africa	2025/09/21	ZAR	Real estate company	JSE	S&P Global
37	Redefine Properties	Redefine Properties Ltd	RDFSJ	South Africa	2028/11/30	ZAR	Real estate company	JSE	S&P Global
38	Redefine Properties	Redefine Properties Ltd	RDFSJ	South Africa	2029/05/16	ZAR	Real estate company	JSE	S&P Global
39	Redefine Properties	Redefine Properties Ltd	RDFSJ	South Africa	2025/12/09	ZAR	Real estate company	JSE	Standard & Poor's
40	Redefine Properties	Redefine Properties Ltd	RDFSJ	South Africa	2026/12/09	ZAR	Real estate company	JSE	Standard & Poor's
41	Redefine Properties	Redefine Properties Ltd	RDFSJ	South Africa	2032/09/21	ZAR	Real estate company	NGX	Moody's Corp

42	Redefine Properties	Redefine Properties Ltd	RDFSJ	South Africa	2026/11/29	ZAR	Real estate company	JSE	S&P Global
43	Redefine Properties	Redefine Properties Ltd	RDFSJ	South Africa	2027/11/29	ZAR	Real estate company	JSE	Climate Bonds Initiative
44	Redefine Properties	Redefine Properties Ltd	RDFSJ	South Africa	2027/09/21	ZAR	Real estate company	JSE	S&P Global
45	Redefine Properties	Redefine Properties Ltd	RDFSJ	South Africa	2026/08/24	ZAR	Real estate company	JSE	KPMG Services Pty Limited
46	Scatec	Scatec ASA	SSONO	South Africa	2028/02/07	NOK	Utility	OSE	Cicero Shades of Green AS
47	Scatec	Scatec ASA	SSONO	South Africa	2025/08/19	EUR	Utility	OSE	Cicero Senter for Klimaforskni
48	Scatec	Scatec ASA	SSONO	South Africa	2027/02/17	NOK	Utility	OSE, FWB	Cicero Senter for Klimaforskni
49	Scatec	Scatec ASA	SSONO	South Africa	2021/11/17	NOK	Utility	OSE	DNV GL Group AS
50	Scatec	Scatec ASA	SSONO	South Africa	2018/11/19	NOK	Utility	OSE	DNV GL Group AS
51	Standard Bank	Standard Bank of South Africa Ltd	STABAN	South Africa	2030/03/02	USD	Bank	LSE	Sustainalytics BV
52	Standard Bank	Standard Bank Group Ltd	SBKSJ	South Africa	2033/03/03	ZAR	Bank	JSE	Sustainalytics BV
53	Standard Bank	Standard Bank Group Ltd	SBKSJ	South Africa	2031/12/08	ZAR	Bank	JSE	Sustainalytics BV
54	Standard Bank	Standard Bank Group Ltd	SBKSJ	South Africa	2034/03/20	ZAR	Bank	JSE	Sustainalytics BV

Candidate summary based on data from Bloomberg (2024)