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Research Report

African Equity and Bond Returns

By

Rollins Niswonger Gutsuru Ayaya

1105172

MCOM FINANCE

in the

SCHOOL OF ECONOMICS AND FINANCE

at the

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG



Supervisor: Mr James Britten

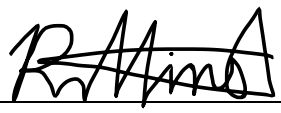
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ABSTRACT

Equities and bonds have historically been the two largest asset classes in the international financial markets. Whether from an international or local perspective, extensive research has been performed on their respective behaviours, especially to determine which asset class was superior. However, Africa's financial markets have been overlooked. This was likely due to lack of data and Africa's relatively small market capitalisation size. This research study explored the gap of literature that overlooked the examination of the dynamics of the two asset classes across Africa, with an emphasis on outperformance and correlation behaviours. With the use of quantitative methods, such as return and correlation metrics, it was found bonds outperformed equities in more than half the countries. The results provide opportunities of international diversification within the region.

Keywords: Equity, bond, returns, correlation, correlation coefficient

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1 INTRODUCTION

Equity and bonds have made up a significant proportion of the international financial markets for decades (Black Rock, 2021). There has been a rich history of these two famous financial assets because they have been two of the most popular asset classes to invest in, inviting extensive empirical studies of them since post-World War II. Numerous studies on their dynamics include Ibbotson et al (1982), Asness (2000), Demirovic et al (2017), Mutize and Gossel (2018), Bouri et al (2019) Doeswijk et al (2020), Chang et al (2023) and Czasonis et al (2021). However, studies on their respective individual behaviours have been done more abundantly.

Regarding the extensive, in-depth research on the dynamics of equities and bond securities, it started with Ibbotson et al (1982). They were popularly known for broadly examining international equity and bond returns. They examined the global size of the two financial assets and their index returns. They performed this study with a purpose of illustrating that "international investors may expect gains from international diversification" opportunities (Ibbotson et al, 1982, pp. 61). Doeswijk et al (2020) expanded the prior's study by also broadly examining the relationship between the popular assets. Many authors more recently examined the two asset classes but merely looked at their correlation relationship.

The purpose of the paper was to determine if there was indeed a superior financial asset class in Africa. It drew inspiration from the above-mentioned authors alongside Mutize and Gossel (2018) and most recent Doeswijk et al (2020). To start off the empirical research history, Ibbotson et al (1982) performed a study on equities, domestic and cross border bonds of the US and 17 foreign countries over a 21-year period - ranging between 1960-80. Their study mainly revolved around developed economies such as the US, Japan, the UK and other European nations. They reported that foreign stocks and bonds generally outperformed U.S. securities, although the U.S did experience outperformance in some periods (Ibbotson et al., 1982). Their data also reported that the relationships between international stock and bond returns, inflation and exchange rates were held imperfectly. The results of their research suggested benefits of international diversification. Their research was stretched further by Doeswijk et al (2020). They investigated multi-asset returns from 1960 to 2017 – an additional 37 years to its predecessor. However, their research had limitations by not broadening its scope to Africa. This gap was partially filled by Mutize and Gossel (2018) who empirically examined within Africa's jurisdiction. Their study focused on the relationship of sovereign credit rating

announcements to the bond and equity markets in Africa. Furthermore, there had been examinations on equity and bond markets in Africa however the studies were significantly limited compared to the larger, mature, more sophisticated American/USA/European Markets. From the foundations of the earlier mention international authors, this study further bridged the gap of financial asset dynamics by empirically focusing on Africa.

As much as there have been studies on the global comparisons of equities and bonds, a lack of focus on Africa suggested that its financial markets have been overlooked. This may be partially due to relatively insignificant size compared to the world. One of the questions that this report aimed to answer was to what extent equities and bonds outperform one another in Africa. Was there one superior financial asset to invest in Africa? How should one diversify? The answer to these questions aimed to help outline to investors how equities and bonds look when weighed together since it has not been known for decades. This study holistically demonstrated what it looked like in the investment space of Africa. The study also briefly outlines the opportunities of one to potentially diversify since no asset perfectly correlates. As indicated, this question was widely asked in the context of developed economies. It had been the general notion that equities outperform bonds because of the weight and impact that equity risk premium pose however, there have been challenges to these theories by Asness (2002) who argues that since 1958, the stock yield had been substantially and consistently below the bond yield. With arguments of equities exhibiting outperformance, if one diversifies, one can consistently produce superior returns. These interesting findings encouraged the aim of the study to observe and examine the relationships between equities and bonds in Africa. The questions asked were which asset base produced superior returns over the sample period? Which asset base was more volatile? What was the correlation between the two asset classes? In addition, the study also addressed the potential diversification strategies– though it is not entirely the focus of the study.

Shifting the focus to Africa, historically, equity and bond relationships have been minorly examined in the continent by Auret and Vivian (2014) as an example. However, they only focused on South Africa in isolation. A sub-region within the grander African economic region. Furthermore, Mutize and Gossel (2018) reported on excess returns in African markets. They addressed the study in the context of credit ratings. They wanted to determine if credit rating announcements influence excess equity and bond returns. However, there had been a lack of empirical research on the comparison between the asset classes. The asset classes were

examined in isolation (Aawar et al, 2023; Pieterson & Botha, 2021; Mukolu & Ilugbemi, 2020; Mpapalika & Malikane, 2019; Mensah & Alagidede, 2017).

Other major topics that have been done pertaining to equities and bonds were their return comparisons. As indicated earlier, there is a conventional view that, stocks always outperform bonds (Siegiel, 1992), in spite of their volatility. However, the outperformance did not last for long in all economic environments (Asness, 2000; Fama and French, 1989; Fama & French, 1993). Siegel (1992), who examined stock returns in US markets over 65 years support this view. Furthermore, McLeod and Frier (1999) performed a study on South African and found results that support the general notion. However, Auret and Vivian (2014) argued that if one financial asset class frequently outperforms other financial asset classes, the other asset classes would eventually disappear. This argument made sense since bond markets, especially corporate bonds, still exist. Their South African study has suggested that bonds have evidence of outperforming equities on numerous occasions. Furthermore, Pieterson and Botha (2021) argued that for the strength of South Africa's bond markets stating that there is no relationship between South African bond and developed bond markets, pointing towards diversification opportunities. The strength of South African bonds suggests that there is no reason for bonds to eventually disappear. One of the questions that this report aims to tackle is whether these notions hold true to the rest of the African financial markets. It is possible that equity can outperform bonds because of the demand by the investors for high returns of risky instruments (Sharpe, 1964).

So, the research examined aggregate equity and bond market values as well as its returns in Africa but what benefits could arise from this research? The answer is that it is beneficial for international investors to understand the dimensions of the market in which they invest. They need to have a better understanding of exactly where the developing world stands and be able to compare the realized returns from a wide variety of alternative investments. One needs to know, based on the dynamics of the equities and bonds, how would one weight their portfolio in Africa. Extensive studies on this topic have been done internationally; more so in US markets with papers published by more recent authors such as Asness (2000), and Ilmanen (2003) and Doeswijk (2020) to earlier literature by Fama & French (1993) and Ibbotson et al (1982).

Ibbotson et al (1982) stated that "the comparative behaviour of securities in different countries tells us about the extent of integration in world capital markets-that is, the extent to which goods, capital and labour actually cross-national boundaries in response to profit opportunities"

(Ibbotson et al, 1982, pp. 61). In a developing market context, it was important to know the weight and extent against the international equity and bond market.

In light of the past empirical findings, what is the aim of the paper? To reiterate, the aim of this report is to present and compare annual aggregate returns on equities and bonds in the respective markets of Africa. Variables of data includes cumulative returns, correlations, the coefficient of variations and other macroeconomic data for 11 countries between 1994 and 2021. The study examined samples from every region of Africa, not merely sub regions such as sub-Saharan Africa, or Northern Africa in isolation. Some of the countries in the study included South Africa and Botswana (from Southern Africa), Kenya (from Eastern Africa), Zambia (from Central Africa), Ghana (from Western Africa) and Egypt (from Northern Africa). The study also briefly examined the advantages of international diversification in Africa.

Equity and Bond data was extracted from various indices of each African nation. This data was primarily collected from Bloomberg. Regarding data collection, Mutize and Gossel's (2018) data map was examined. Please take note that, they looked at a different context – sovereign credit rating and excess returns of financial assets. The type of data that they collected were incredibly similar to this report. They managed to obtain equity and bond data of 19 countries between 1994 – 2014 from Bloomberg and Reuters. The methodological approach made use of simple return calculations such as geometric return and measures of dispersion such as variance and coefficient of variation – which measures risk by level of return.

Implicit from the guiding questions posted earlier, there are certain hypothesis that inform this study and shall be tested. I endeavoured to justify the hypothesis. These include:

I. Equities are a lot riskier than bonds and therefore bonds will produce superior, risk adjusted returns in most of the sampled countries.

The basis behind this hypothesis was: according to Prudential Investment Managers (2018), "From an international investor's perspective, the perceived risk-return trade-off of investing in South Africa had deteriorated on an absolute basis and was also less favourable on a relative basis compared to certain emerging and developed markets." This argued that South Africa is risky but what does that mean for the rest of Africa? The contagion effect may argue that what happens in South Africa may affect the rest of Africa. Therefore "when something goes wrong in one emerging market and investors sell their holdings in that country, they often decide to sell associated investments in other emerging markets" (Prudential, 2018). Equities are more

volatile than bonds and therefore bonds could be the safer investment that produces superior returns in most years for some countries.

II. Equities and bonds do not perfectly correlate in Africa.

This spoke to the relationship between equities and bonds in Africa. The correlation coefficient is what determines the co-movement (or lack of) between the financial assets. If one perfectly (or at least near perfectly) correlated with the other, it shows that when one asset grows in value the other will; and when one drops in value, the other will drop alongside. It is rare to find perfect correlations between two asset classes. Demirovic et al (2017) examined the correlations between equities and bonds in the USA. They found that while the average correlation between both may be positive, they were not perfect. In addition, firms that issue both equities and bonds, expose them to the same market risks. Due to that, "their values should be systematically and positively correlated in complete markets" (Demirovic, et al., 47). In addition, Capeillo et al (2006) found asymmetries in conditional correlations equities and bonds. This lead to the second hypothesis.

To emphasise, the importance of this study was that it aimed to weigh Africa's place in the international equity and bond market. It aimed to provide academics and investors a better understanding of the investment picture of African equities vs bonds. This could be a steppingstone to examine international diversification opportunities (in further studies). Benefits of the phenomenon have been highlighted by Asness et al (2011). The authors provided evidence that international diversification does an excellent job in protecting investors over the long-run. Additionally, Pieterson and Botha (2021) found that international diversification may be beneficial in the long-term if one appends South Africa into their portfolio. One of the reasons outlined was its weak reaction to short-term shocks (bonds specifically). Ibbotson et al (2012) too highlighted benefits of diversification by reporting that if asset returns are imperfectly correlated, risk is reduced at a given level of expected return and their results showed that from US perspective, investments in foreign markets generated superior returns.

As mentioned above, this study is an extension of Ibbotson et al (1982) and Doeswijk (2020). Their research enabled the readers to assess the basic relationships among asset classes, between risk and return, and between nominal and real returns. This study too aimed to provide that value. Additionally, the study aimed to provide future researchers, professional fund managers and regulators important information on Africa's financial asset classes. This study

aimed to contribute to the growing literature in the field of Portfolio Management and Evaluation.

The results of the research study are mixed. Bonds outperformed equities in more than half the countries examined. This further resulted in an over 50% portfolio weighting in favour of bonds to most of the sampled countries. They yielded higher compound and mean returns, which allowed them to cumulatively outperform their equity counterpart. Furthermore, the correlations between equities and bonds were non-perfect, allowing opportunities of international diversification.

The study was organised as follows; it first examined the prior literature revolving around the topic of equities and bonds in Africa, followed by an empirical section which outlined the methodological approach used to compare, examine and discusses the results of the empirical findings. The study then ends off with a conclusion and recommendation for further study.

2 LITERATURE REVIEW

2.1 Introduction

This chapter of the study provides a synthesis of literature on the topic, documenting the state of the field, such as context of the African market and gaps in the academic literature. Due to the purpose of this chapter in the overall study, the review results were organised as follows: (i) Africa's financial market and their weaknesses (ii) cross-correlations (iii) international diversification (iv) cross-border bonds (v) inflation and monetary policy positions (vi) credit ratings and security positions.

Financial literature (Asness, 2000; Dean et al, 2010; Fama & French, 1989; Fama & French, 1993; Ilmanen, 2003) have supported each other on the basis that equities consistently outperform other financial asset classes - especially bonds. However, their findings have highlighted that no asset class continuously outperformed their counterpart in all economic environments. Auret and Vivian (2014) have regarded this popular equity outperformance view as irrational because of the view that "if one class consistently and materially outperforms other asset classes, in the absence of other reasons, the other asset classes would disappear" (Auret & Vivian, 2014, pp. 175). Fanta and Makina's (2017) findings are in support of Auret and Vivian (2014). Fanta and Makina (2017) pointed out that the bond market promoted more economic growth in South Africa than the stock market. This was found through capitalisation measurements. According to Fanta and Makina (2017), the bond market capitalisation to GDP ratio grew from 19% in 1990 to 31% in 2010. This suggested why the one asset class (bonds) have not eventually disappeared – per Auret and Vivian's (2014) statement. Furthermore, IMF's (2022) 'Financial Sector Assessment Program' noted that the size of the domestic bond market in relation to GDP was sitting at 85% by June 2021. This was a jump from 31% outlined by Fanta and Makina (2017). This emphasises Auret and Vivian's critique of the outperformance of one asset class erasing the need for alternative assets. Pieterson and Botha (2021), observed that the South African bonds were much less influenced by short-term shocks in comparison to their sampled developed bond markets (USA, UK, and Germany). This was indicative of the power of bonds and thus suggest for diversification opportunities which will be addressed later in the literature review.

Auret and Vivian (2014) conducted a comparative study of total returns on equities, bonds and cash. Their results pointed out that even before adjusting for risk, there was no notable

difference between the returns of equities over long bonds over their 1986–2013 sample period. It was even more evident that bonds outperform equities when a system of rolling periods was used. Moreover, after adjusting for risk - using the Sharpe ratio - bonds outperformed equities. It is to take note that this African study was done in isolation, focusing only on South Africa as opposed to the continental Africa region. Their study provided an in-depth understanding of returns in a South African context but did weigh their findings against African international markets. With that being said, this section will outline the underlying literature of the study and attempt to review it in the context of Africa.

2.2 Africa's financial market and its weaknesses

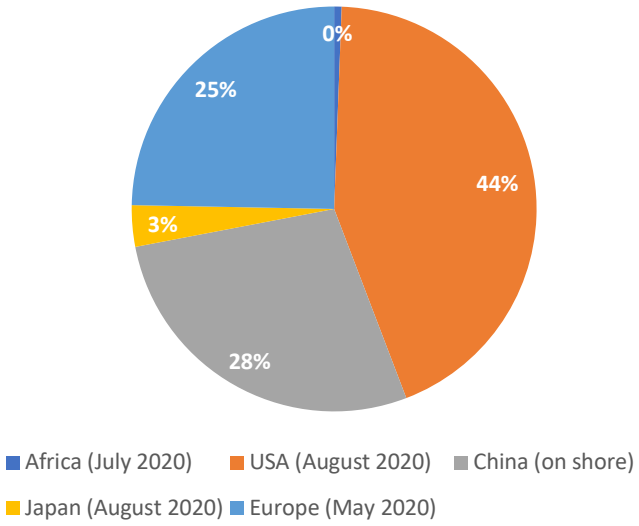
Africa's financial market research has been limited in comparison to the developed world. However, research has grown significantly. Adeabah et al (2023) performed a unique systematic literature review and bibliometric network analysis on Africa's research of its financial markets over a 30 year span (from 1992 to 2021). Although there is more work to be done, the authors highlighted an increased trend of financial market research, which suggest an increased interest and curiosity of Africa. Most research merely focuses on volatility, returns, market efficiency and financial market integration (Adebah et al, 2023). The authors identified limitations to research of African markets, especially equity markets and that is lack of knowledge exchange. Overall, research is mainly segregated into seven topics. A few named are asset pricing, financial integration, efficiency and predictability of stock returns and herding.

Africa historically has a relatively small but growing capital market to the rest of the world. The region has increasingly become "a frontier for investment and world economic development" (Boako & Alagidede, 2017, pp. 360). The working age population has been increasing which opens doors for the continent to enhance intra-African trade, increasing capital across borders and the rest of the world (Boako & Alagidede, 2017). Africa's equity market grew from $113 billion in 1992 to around $2 trillion before sitting at $1.5 trillion as of September 2013. South Africa dominated the cap size, owning 63% ($970 billion) of the market capital. Namibia came second (sitting at $137 billion), followed by Nigeria – who sat at $137 billion (Africa Strictly Business, 2021). The African economy has historically been heavy dependent on its commodities endowment, however this dependency was not reflected in their respective stock markets (Boako et al, 2021). The commodities measured were oil, diamond, precious metals, coffee and tea (to name a few). Boako et al (2020) observed that the

relationship between their sampled Africa's equity and commodities market were weak on both directions in their 22 year study (1996 to 2018). Furthermore, Atenga and Mougoué (2020) addressed how international shocks are spilled over into African equity markets. It was found that oil and metal prices were the main impactors from foreign markets into Africa.

Furthermore, according to the United Nations Conference on Trade and Development (UNCTAD, 2023), foreign direct investment fluctuated from $45 billion in 2019, to $83 billion in 2021 back to $45 billion in 2022. In Africa alone, with the assistance of international financial institutions, the number of stock markets expanded from less than 10 in the late 1980s to 26 in present times Alagidede (2011).

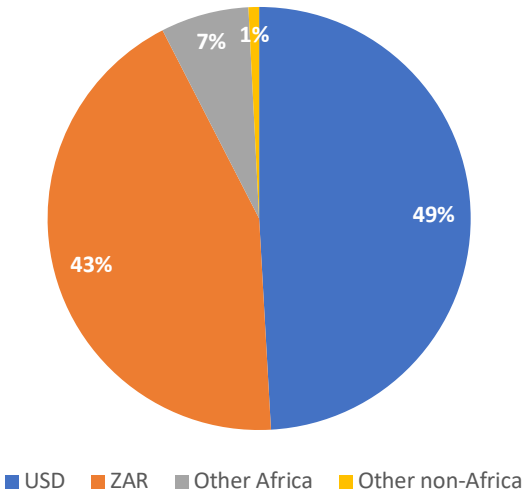
Similarly to the equity market, Africa's bond market has been relatively small in comparison to the world's. As of July 2020, the International Capital Market Association (ICMA) reported, in Figure 1, that the Africa's corporate bond market was $149.5 billion compared to the global $40 891 trillion (August 2020) size. This calculated to about 0.3656% of the world's bond market which is insignificant compared to the dominant US ($10.9tn) and Chinese ($7.4tn) bond markets. Between these two financial powerhouses, they made up for about 45% of the corporate bond market. According to Mu et al (2013), the African bond market has been growing steadily, despite its underdevelopments.



Source: Bloomberg (2020)

Figure 1: Pie chart illustrating the global share of corporate bonds

Figure 2 displays the African bond market by currency. With about 50% ($75 billion) of the issues being issued in ZAR and 43% ($64,5 billion) being issued in USD. This indicated that the African bond market is being largely dominated by South Africa.



Source: Bloomberg 2020

Figure 2: Pie chart illustrating African bond market by currency

Mu et al (2013) analysed the determinant of African government and corporate bond market capitalisation. For corporate bonds, they observed that level of economic development, financial market development and interest rate volatility directly influenced its market capitalisation and interest spreads inversely affected it. They further observed that government bonds are directly related to interest rate volatility and inversely related to exchange rate volatility and interest rate spreads however, government securities will not be the focus of the research.

Since Mu et al (2013), Dafe et al (2023) further examined other determinants that affect Africa's local currency bond markets. These include dependence on the global financial cycle, macroeconomic policy making and the political state of the host countries. Their study was collated through both quantitative and qualitative means – which were statistical data and interviews with policy makers their sampled African countries.

Fortunately, Africa's bond market has been growing. African development bank, for an example, announced and utilised plans that launched a bond program for infrastructure to raise US$40 billion for investments in projects - such as ports and airports. As of the time this study

was conducted, the project reached approval stage and is yet to come to fruition. This highlights the growing role for bond markets in financing development in sub-Saharan Africa (Mu et al, 2013; Dafe et al 2023). As briefly mentioned earlier, using an econometric model, Mu et al (2013) analysed the key determinants of African government and corporate bond market capitalization. They reported that the corporate bond market was directly related to economic development and inversely related to higher interest rate spreads (Mu et al, 2013). This indicated that African countries would benefit from greater access to financing. Since then, Dafe et al (2023) further examined the development of the bond market in Africa. They focused on the development and implications of local currency bond markets and discovered that local currency bond markets offer benefits such as mitigating risks associated with foreign currency debt. This argument was supported by Pieterson and Botha (2021) who argued that the South African bond market is less affected by international short-term shocks.

Since the mid-1990s, local currency debt to total debt ratio (for low-income countries) grew from 19% to 35% in 2021 (Chuku et al, 2023). This is due to low interest rates and growth prospects found in the developing markets (Dafe et al, 2023).

There have, however, been a few issues that the African bond market experienced. It is important to acknowledge these issues and demonstrate reasons of why and how these matters were solved. One of these included western donors experiencing their respective fiscal challenges, causing a pullback in donor flows. Without access to alternative sources of finance, including bond markets, many African countries could find it difficult to finance critical needs (IMF, 2012). The IMF further argued that the sub-Saharan African bond markets could improve their intermediation of savings. How? Their argument was that although the economic region needed money, Africa was a net capital exporter to the rest of the world (IMF, 2012). Furthermore, other authors supported the IMF's view by stating that there was "a lack of effective intermediate channels to absorb [needed] capital. Bond markets [were] an effective way to intermediate capital savers with capital users" (Mu et al, 2013). There was evidence of bond markets providing economic sustainability and risk mitigation (Fanta & Makina, 2016; Pieterson & Botha, 2021). They observed that the bond market - rather than stock market, bank and non-bank institutions - promote economic growth in South Africa. This gave rise to an intriguing question of what unique roles bond markets play that other intermediaries such as equity markets were unable to play (Fanta & Makina, 2016).

Other issues included Africa's dependence on the global financial cycle and its relative higher costs of debt in comparison to developed markets. Additionally, it was found that macroeconomic policy making constrained development in Africa's bond market (Dafe et al, 2023).

2.3 Cross Correlations

Investors rely on the stock-bond correlation for multiple reason including forming optimal portfolios, designing hedging strategies, and assessing risk (Czasonis et al, 2021). Ibbotson et al (1982) found equity co-movements in relation to geographical proximity, institutional currency relationships, partnership in trade, cultural similarity of economic bases of the countries. With regards to geographical proximity, their results showed that European equities exhibit a co-movement. Geographically adjacent countries such as Germany, Switzerland and the Netherlands supported these results. In addition, the UK, France, Belgium and the Netherlands, all of which faced the trade routes of the English Channel, thus experiencing a co-movement. Counterintuitively, countries with cultural similarities exhibited different results. Some experienced low equity correlations (such as Norway and Sweden (-0.1). This may be due to them having different economic bases – with Norway being a resource-based economy and Sweden being industrial. However, Asian countries experienced high co-movements. In addition, English speaking countries also experienced high correlations. There unfortunately has not been studies that have been done in the same manner since.

On the other hand, investigations of dynamic relationships between equity and bonds have been examined very few times (Doeswijk et al, 2020; Papadamou et al, 2021; Abuzayed & Al-Fayoumi, 2022). Doeswijk et al (2020) did a thorough study, making use of the MSCI All Countries World Index – which consisted of 23 developed markets and 24 emerging markets. They observed a moderate 0.52 correlation between the two financial asset categories. Papadamou et al (2021) examined whether investors move from stocks to bonds during market collapse in USA, Europe, Asia and Australia regions. This required correlation analysis and the authors observed that the stock-bond correlation is generally positive pre-COVID but subsequently turned negative during the recent pandemic. Lastly, Abuzayed and Al-Fayoumi (2023), examined the conditional correlation between green bonds and four major asset class – two of which are stocks and bonds. Their findings produced a weak positive correlation between green bonds and the MSCI Global Index. The overview of the equity-bond dynamic has been studied and discussed from a global, developed perspective however, there were gaps that need to be addressed in the overlooked African markets.

Shifting focus back to Africa, Boako and Alagidede (2017) did not look at equity-bond dynamics but examined co-movements of equity market in Africa from the period ranging between 2003 and 2014. They examined the co-movements of Africa's eight largest equity markets (Ghana, Nigeria, South Africa, Botswana, Morocco, Tunisia, Egypt and Kenya) and reported it being positive. Their findings support increasing literature on co-movements among international equity markets. The authors also reported co-movements of Africa's equities with the global commodities index during the global financial crisis period. They found that the co-movements were stronger and noticeable for most countries – such as South Africa, Kenya, Nigeria and Botswana. This suggested that these markets cannot be sheltered from the widespread effects of global financial shocks. Their results contradicted Alagidede (2011) who earlier found negative cross correlations. Further research had not been explored by the prior authors.

2.4 International diversification

International diversification is the attempt to reduce risk by investing in more than one nation. There have been challenging theories revolving around the topic; does diversification work in the short-run or the long run? As indicated earlier in the introduction, Asness et al's (2011) answered the question by suggesting that international diversification has demonstrated evidence of protecting investors in the short run and increased as time passed into the long run horizon. In likeness, Ibbotson et al (2012) reported that if asset returns are imperfectly correlated, risk is reduced at a given level of expected return and their results showed that from US perspective, investments in foreign markets generated superior returns. Other questions asked and addressed previously were the benefits of international diversification. Questions like this were addressed by Schröder (2003) who explained the benefits of internationally diversifying equities and bonds in Europe. He stated that purely investing domestically generated sub-optimal portfolio returns. The risk-return ratio of investing in one country was lower if one invested in France alone (for an example) as opposed to investing internationally. However, investors possessed a home-bias information asymmetry because of the lower information costs of domestic equities and bonds. Since then, Chniguir et al (2018) aligned with Schröder's (2003) findings. They examined the degree of home bias within a holdings portfolio. Results showed that all their 20 investigated countries recorded high level of home bias in their respective portfolios (Chniguir et al, 2018). They examined both developed and emerging economies and further observed that due to language, legal framework and high

volatility of exchange rate of emerging countries, investors from developed economies such as the USA were reluctant to invest.

These disinclined behaviours and theories have inspired Pieterson & Botha (2021) and Moudud-Ul-Huq et al (2023) who have argued for diversification in South Africa (an emerging market player). As briefly mentioned earlier, they argued that due to the lack of co-movement between the South African bond market and developed bond markets, diversification opportunities were present; especially since South African bonds had resistance to short-run shocks and unexpected crises (Pieterson & Botha, 2021). However, the limitation of Pieterson and Botha's (2021) argument was that they only looked at South African sovereign bonds in isolation. Stock returns were not taken into account.

This gap in literature can be addressed by Alagidede (2011) and Aawaar et al (2023). Alagidede reported a negative correlation between African and developed markets. This sparked overall interest within their fast-growing economy. In 1994, African markets boasted massive gains (in USD) with Kenya, Ghana and Egypt generating 67% plus returns. In 1995, the African stock exchanges gained by about 40% in their indices and by 44% in 2004, which surpassed Morgan Stanley Capital International (MSCI) global index of 32% and the US S&P's 26% gain. The region's negative correlation provided benefits of portfolio diversification (Alagidede, 2011). However, Aawaar et al (2023) argued that most African stock markets experience volatility spill overs from developed economies. They analysed both pre and post-crisis global crises episodes - such as the 2008 financial crisis and the COVD-19 pandemic. Their findings revealed that sub-Saharan African stock markets were becoming sensitive to market volatility during the major crises. They have been susceptible to treasury bill rates, exchange rates and other main drivers – such as volatility of US and UK stock markets (Aawaar et al, 2023). North Africa was the only exception to these findings which suggested for diversification opportunities.

Regarding market timing, Auret and Vivian (2014) performed an analysis displaying that had an investor had the best foresight of the best performing three asset classes (equity, bonds, and cash), he would achieve a 65 949.28% gross return over 27 years against 4 822.56% gross return had he invested in the All Share (over 26 years). Behold that these results speak more about the blend of market timing and diversification. Achieving these returns are challenging in the real world but the resulting gross returns indirectly convey the benefits of diversifying between stocks and bonds. It mainly reported that if one made use of active management and

has the utmost superior stock picking skills, one could abnormally benefit from diversifying in stocks and bonds.

2.5 Cross-border bonds

As opposed to domestic bonds. A cross border bond is a bond issued in a country or currency other than that of the investor or broker. We consider a bond to be domestic if (i) the currency of the bond is the currency of the borrower's home country and (ii) the bond is primarily bought by nationals of the borrower's home country (Ibbotson et al, 1982). Bonds can be exposed to risks such as political and exchange risks.

Bergant et al (2023) researched cross-border investments in emerging market bonds. They focused on European investors and observed that they exhibit preferences in euro-denominated and sovereign emerging market bonds. Argument of attractive sovereign market bonds was also outlined by Pieterson and Botha (2021). They tend to invest more when the economic environment of the countries improves, and the US monetary policy is loosened (effects of monetary policy will be discussed later in the literature review). On the contrary, they sell emerging market debts when global financial stress is high. Additionally, in a case study for BRICS countries, they found that European investors treat emerging market bonds issued through offshore affiliates differently from onshore, they suggest that this may reflect differences in currency composition.

2.6 Inflation and monetary policy positions

Interest rates consists of a low, real riskless rate of return plus anticipated inflation rate over the life of the security. Therefore, interest conventionally have a strong relationship with inflation rates and short-term yields. Ibbotson et al (1982) reported that International Bonds and Equity inflation hurts both stock and long-term bond markets. Since then it was later reported in a 217-year US study by Tiwari et al's (2020) that stock returns have no short to medium term relationship with inflation. However in an African market like Nigeria, there was a significant relationship between the two variables (Mukolu & Ilugbemi, 2020; Ogbebor et al, 2021). Furthermore, Asiedu et al (2020) reported that inflation had negative effects on stock index performance in their 10-African country sample.

On the other hand, for bonds, it was argued that in the USA, high inflation negatively affects bond returns by lowering it in real terms (Campbell et al. 2020). Unfortunately there were no empirical studies that evaluated the relationship between inflation and bond returns. Only Zhou (2021) assessed the relationship but only looked at sovereign bonds which is out of the scope

of this study. Its findings aligned with Campell (2020) – inflation had negative effects on bond yields (Zhou, 2021).

There could be potential effects that monetary policy had on the performance of equities and bonds. Monetary policy is how central banks manage the money supply to achieve their goals (SARB, 2021). Different countries have their own monetary policy framework, such as: what does one need to do to achieve their goals? According to the South African Reserve Bank, they have made use of inflation targeting to achieve their monetary policy objectives. They have been performing this practice since the year 2000. Other monetary policy frameworks include nominal income targeting, exchange rate targeting and nominal income targeting. Developed countries such as the United States Federal Reserve have been promoting maximum employment, stable prices and moderate long-term interest rates (US Gov, 2020). Nigeria made use of exchange rate targeting for a little over a decade (1959 to 1973) before shifting to direct monetary control until 1993 and indirect monetary control to date (Central Bank of Nigeria, 2016). Kenya makes use of inflation targeting (Central Bank of Kenya, 2021).

Garcia-Feijoo and Jensen (2014) investigated the relationship between monetary policy changes and stock returns. They found that both expansionary and restrictive monetary policies affect returns. An expansionary monetary environment is when a central bank lowers interest rates to stimulate economic growth while restrictive is when central bank increase interest rates in order to slow down economic growth of its domestic economy. The authors more specifically examined if they would affect long-run reversals. A long-run reversals occurs when firms with poor past performance rebound and produce superior returns compared to firms with good historic past performance. The point of the statement in this section is to inform that monetary environment do indeed have effects of financial assets, especially equities.
In addition, South African study, by Ayaya et al (2022), reported that under expansive monetary conditions, monetary policy changes did have an influence on poor performing JSE firms. This study however looked at sample firms instead of indexes. Take note that the examination of the monetary policy framework will not be a focus of the study. This sub-section aimed to add context to the African financial markets.

Regarding monetary policy-corporate bond relationship, Guo et al (2020), examined the dynamic in US markets. They obtained a negative response of excess returns on corporate bonds to monetary policy shifts. The shifts were generally undiscriminating to credit ratings

over both medium and long maturities. However, it was found that the shift impact of lower credit rating bonds was more significant in comparison to bonds of healthier ratings (Guo et al, 2020). The biggest reason why corporate bond returns negatively respond to monetary policy tightening is because of higher future expected excess bond returns. It assumes smaller magnitude of bonds bought. Within Africa, there presents a knowledge gap.

2.7 Credit ratings and security issues

Mutize and Gossel (2018) did a study focusing on the influence that sovereign credit rating (SCR) announcements have on bond and equity returns. The authors' study found that most African countries' SCRs are rated below investment grade, which makes them suffer from illiquidity challenges. Due to this, SCRs do not significantly impact African financial market returns because they are already perceived as risky markets. For Eurobonds, about a third of rating actions directly impacted bond yields in African countries (Rusike & Alagidede, 2021). The only statistically significant events were yields were affect were when South Africa and Namibia were downgraded to non-investment grade in 2017. Bond investors adjust to information in real time and as a result, credit rating announcements produce insignificant resilience (Rusike & Alagidede, 2021).

3 Description of data and research methodology

This chapter addresses how the data that was collected and how the research was conducted to achieve the primary objective of comparing and analysing the returns of equities and corporate bonds of various respective countries. Through the methods conducted, it was possible to answer the following questions that were mentioned in the introduction. These questions mainly include: (i) which asset base produced superior returns over the sample period? (ii) Which asset base was more volatile? (iii) What was the correlation between the two?

3.1 Sampling and Data Collection

The data of this research study was extracted from Bloomberg terminal. The equity data indices were inspired by Mutize and Gossel's (2018) study and applied to this study however, this study focuses more on corporate bonds as opposed to Mutize and Gossel's (2018) sovereign bond data. Therefore, the data menu applied was similar, it was a minor adaptation of the prior authors. Weekly price data of the equity and bond indices were obtained however, the prior authors obtained data from 19 counties (eight more than this study). These 19 countries had a presence of both equity and corporate bond indices at the same time. However, this study managed to obtain and examine 11 out of the prior research's 10 countries, who had the presence of the two financial asset classes. It was made sure that each region of Africa was selected for the research study. There was a reduced geographic bias, meaning, the research did not primarily focus on sub-Saharan Africa or Northern Africa, for an example. The data sample had a dispersion of representation in Northern, Southern, Eastern and Western Africa. The sample was merely selected based on availability of data.

The countries and their indices were as named in Table 1:

Table I: Table displaying Sample Countries and their respective Equity and Bond indices

Country	Equity	Bond
South Africa	JSE (JALSH Index)	SPFIZAUT Index
Botswana	BSE (BGSMDC Index)	SPFIBWUT Index
Burkina Faso	BRVM (BRVMCI)	N/A
Egypt	EGX 100 (6EGX 100 Index)	SPFIEGUT Index
Ghana	GSE (GGSECI Index)	SPFIGHUT Index
Kenya	NSE (NSEASI Index)	SPFIKEUT Index
Malawi	MSE (MWSIIDX Index)	SPFIMAUT Index
Mauritius	SEM (SEMDEX Index)	SPFIMUUT Index

Morocco	CasaSE (MOSEMDX Index)	N/A
Nigeria	NSE (NGXINDX Index)	SPFINGUT Index
Rwanda	RSE (RSEASI Index)	N/A
Tunisia	BVMT (TUSISE Index)	SPFITN Index
Uganda	USE (UGSINDX Index)	SPFIUGUT Index
Zambia	LuSE (LUSEIDX Index)	SPFIZMUT Index

Source: Researcher's synthesis

The data in the sample did have limitations, including varying starting dates. Some countries such as Botswana, Mauritius and South Africa had data dating from 1994 and 1995 respectively while other countries had starting dates as late as 2006 (Egypt) and 2008 (Kenya). Additionally, the bond index data varied with South Africa commencing in 2000, Egypt in 2008 and Mauritius in 2013.

Table II indicates the period sample of each country examined:

Table II: Table displaying individual Sample Periods of each Equity and Bond index

Country	**Equity period range**	**Bond period range**
South Africa	30 June 1995 – 10 December 2021	31 December 1999 – 10 December 2021
Botswana	25 Feb 1994 – 10 December 2021	2 December 2021 – 10 December 2021
Egypt	5 January 2006 - 7 May 2020	3 December 2009 – 10 December 2021
Ghana	31 December 2010 – 10 December 2010	1 May 2009 – 10 December 2010
Kenya	29 February 2008 – 10 December 2021	30 May 2008 – 10 December 2021
Malawi	15 November 1996 - 10 December 2021	3 September 2010 - 10 December 2021
Mauritius	14 January 1994 - 10 December 2021	4 January 2013 - 10 December 2021
Nigeria	2 January 1998 - 10 December 2021	4 May 2007 - 10 December 2021
Tunisia	16 April 1999 - 10 December 2021	28 September 2012 - 10 December 2021
Uganda	31 October 2003 - 10 December 2021	29 August 2008 - 10 December 2021
Zambia	3 October 1997 - 10 December 2021	2 July 2010 - 10 December 2021

Source: Researcher's synthesis

As indicated above, the sample period did not exactly start and match from January 1994, hence why the dates of each country were precisely indexed so that one could compare and analyse performances of equities and bonds of each African nation. The differing starting dates were indexed to have similar starting and end dates in order to compare perfectly the returns of equities and corporate bonds. Comparisons can only be made when the start dates co-incide. However, this can introduce start and end date bias, which is a caveat of the study. A potential way to address this is to use rolling return windows as Auret and Vivian (2014) did.

The new, overlapping sample dates were as follow in Table III:

Table III: Sample period of each respective sample country

Country	Overlapping period
South Africa	31 December 1999 – 10 December 2021
Botswana	2 December 2021 – 10 December 2021
Egypt	3 December 2009 - 7 May 2020
Ghana	31 December 2010 – 10 December 2010
Kenya	30 May 2008 – 10 December 2021
Malawi	3 September 2010 - 10 December 2021
Mauritius	4 January 2013 - 10 December 2021
Nigeria	4 May 2007 - 10 December 2021
Tunisia	28 September 2012 - 10 December 2021
Uganda	29 August 2008 - 10 December 2021
Zambia	2 July 2010 - 10 December 2021

3.2 Variables

The methodological approach of the study was inspired by Ibbotson et al (1982) and Auret and Vivian (2014). The research presents annual total and cumulative returns on equities and bonds, along with correlations and regression results, exchange and inflation rates and some other macroeconomic data, for 19 countries for period ranging between 1994 and 2021.

Short term and long-term yields were be compared, exchange returns and inflation rates on a country-by country basis.

3.3 Analytical framework

3.3.1 Effective compound (or geometric) rate of return

To calculate the geometric rate of return, we first needed to know the total rate of return before understanding the value of the asset and ultimately the geometric rate of return of that asset. The total rate of return were calculated as follows:

$$r = (P_1 - P_0 + I_1)/P_0 \quad (1)$$

Where P_0 is the was the price of an asset at the beginning of the month and P_1 was the price of the asset at the end of the month. I_1 was denoted as the income received during the month. Therefore, to derive the value of asset at the end of month one, the formula would be expressed as follows:

$$V_1 = P_0(1 + r_1) \tag{2}$$

Where r_1 was the total return for the respective month (equation 1).

One needs to know the total number of months in order to calculate the value of an asset V_N (Where N is the total number of months). The value of an asset after N months will be easily calculated as:

$$V_N = P_0(1 + r_1)(1 + r_2)(1 + r_3)(\dots)(1 + r_N) \tag{3}$$

or

$$V_N = P_0 \prod_{j=1}^{j=N} (1 + r_j) \tag{4}$$

3.3.2 Annualised compound (or geometric) rate of return

The geometric return was calculated and extracted from the above equation. In order to determine the effective rate of return, one needs to calculate as follow:

$$r = \sqrt[N]{\prod_{j=1}^{j=N} (1 + r_j)} - 1 \tag{5}$$

This permits a comparison for each asset class over the entire period or sub-periods (Auret and Vivian, 2014).

3.3.3 Measures of dispersion

The standard deviation and other measures of dispersion such as variance and the Sharpe ratio. These variables are accepted in Investment theory to calculate risk.

Standard deviation:

$$\sigma = \sqrt{\sum \frac{(r_t - \bar{r})^2}{N - 1}} \tag{6}$$

Where the numerator is the return of the asset at time t minus the mean of the asset portfolio. And the denominator is the number of months. The standard deviation of an asset/portfolio was used to interpret the volatility of the asset.

Variance:

$$\sigma^2 = \sum_{t=1}^{N} \frac{(r_t - \bar{r})^2}{N - 1} \tag{7}$$

The variance is also a measure of dispersion. It is merely the square of the standard deviation of portfolio.

Sharpe ratio:

$$Sharpe\ Ratio = \frac{r_p - r_f}{\sigma_p} \tag{8}$$

Where r_p was the return of an asset and r_f was the risk-free rate which will be the 91-day treasury bill (T-bill) rate of the respective African central bank.

Coefficient of Variation:

$$Coefficient\ of\ Variation = \frac{\sigma}{\mu} \tag{9}$$

The coefficient of variation was a statistical measure of dispersion of a data series around the mean. In the context of portfolio management, it specifically measures the how much risk was assumed per amount of expected return. Where 'σ' is the annual standard deviation of returns and 'μ' was the arithmetic mean of returns.

4 RESULTS AND DISCUSSION

This chapter addresses the results that have transpired from the empirical methodology applied, above. It first addresses the summary results, where the basic statistics such as the compound return, arithmetic mean and standard deviation of the 11 sample countries are addressed and analysed, for equities and bonds respectively. This is followed by a time-series analysis, where the performance of equities and corporate bond returns will be depicted and analysed over a general time period of between 1999 and 2021. The results chapter will then end off with cross-correlation examinations and a brief discussion on international diversification.

4.1 Summary results

Table IV: Summary statistics of African Equities

	Annual Returns			Year-end wealth index
Asset	Compound return	Arithmetic mean	Standard deviation	(Start date = 1.00)
South Africa	9.75%	11.55%	18.93%	8.55
Botswana	0.00%	0.10%	4.27%	1.00
Egypt	-0.21%	3.20%	25.91%	0.98
Ghana	9.40%	10.19%	12.54%	2.81
Kenya	2.96%	4.55%	17.77%	1.50
Malawi	19.20%	19.83%	11.16%	8.76
Mauritius	2.04%	2.70%	11.43%	1.20
Nigeria	-0.85%	1.79%	22.99%	1.41
Tunisia	3.68%	4.07%	8.77%	1.41
Uganda	2.55%	4.87%	21.58%	1.41
Zambia	5.43%	6.13%	11.78%	1.87

Table IV depicts the summary statistics of equity returns amongst the sample African nations between January 1994 and December 2021. The range of annual compound returns on equities was from -0,85% (Egypt) to 19,20% (Malawi). Only one country in the sample managed to yield a double-digit average compounding return over the sample period (1994 to 2021). This significant growth may be attributed to the rapid GDP growth of Malawi since 2000, considering that Malawi has one of the least developed financial sectors in Africa (Simwaka et al, 2012). While the remaining 10 nations achieved single digit annual compound returns. With regards to volatility, nine out of the 11 countries in the equity sample exhibited double digit standard deviations. Botswana and Tunisia were the only nations found to have single digit standard deviations of equity returns (4,27% and 8,77% respectively).

The arithmetic mean of returns of the African equity indices ranged between a modest 0,1% (Botswana) to an abnormal 19,83% (Malawi). Three out of 11 of the African equity indexes in the sample yielded double digit mean returns over the sample period being South Africa (11,55%), Ghana (10,19%) and Malawi (19,83%). Only four nations in the sample managed to yield an arithmetic mean of returns greater than 5% per annum. In addition to the double-digit nations listed above, the country that had an arithmetic mean yield of more than 5% per annum was Zambia – who produced an average of 6,13% per annum. South Africa, Ghana and Malawi all experienced inflation surges during the sample period. According to Statistics South Africa (2022), South Africa had had volatile annual inflation rate experiences with inflation ranging between at 0.2% to 13%. Ghana had it at a greater scale, averaging over 15% between 2014 and 2017 (in its limited sample period) and hovering around 10% until December 2021 (Ghana Statistical Service, 2022). Malawi mainly had annual inflation rates of over 20% per year until 2017. Though inflation may be the leading cause of the high returns, this study did not focus on the impact that inflation had on equity yields.

Moving the focus now to the last column of Table IV, we find the year-end wealth index – which was an indication of how well one's wealth would grow if one unit of local currency was invested in its respective index. For an example, if one invested R1 in South Africa at its beginning period (2000), one would have accumulated R8,55 by December 2021. Every nation but Egypt experienced an in increase in their wealth with nations. The top ranked nation that yielded the best wealth index performance was Malawi (8,76), South Africa (8.55), Ghana (2.81), Kenya (1.5) for every 1 unit of currency invested. One would only experience a loss in Egypt by losing a mere two cents for every dollar invested since the start of one's respective sample period (December 2009).

Table V reveals the summary statistics of corporate bonds during the respective time periods of each nation. These statistics were be analysed and weighed against the equity results of Table IV. The overall summary statistics of corporate bond performance was higher than their equity counterpart. The compound annual returns, arithmetic mean, and cumulative returns all yielded higher results to what was depicted in Table IV. This meant that the compound return, arithmetic mean, and cumulative returns of each bond index outperformed their respective equity indices. Six out of 11 bonds outperformed their equity counterpart in the compound return, arithmetic mean and cumulative return category.

Table V: Summary Statistics of African Bonds

Asset	Annual Returns			Year-end Wealth index (Start date = 1.00)
	Compound return	Arithmetic mean	Standard deviation	
South Africa	5.28%	7.57%	21.26%	3.20
Botswana	0.47%	0.85%	8.71%	1.05
Egypt	4.53%	5.08%	16.52%	1.42
Ghana	8.70%	5.58%	13.45%	1.67
Kenya	7.38%	7.79%	8.99%	2.72
Malawi	3.73%	3.95%	6.46%	1.53
Mauritius	1.77%	1.97%	6.18%	1.17
Nigeria	3.80%	5.02%	14.97%	1.75
Tunisia	0.03%	0.05%	2.11%	1.00
Uganda	8.51%	9.05%	10.23%	3.11
Zambia	8.06%	10.30%	21.25%	2.52

Corporate bonds outperformed equities by the following basis points in the annual compound return category: Botswana (47bp), Egypt (474bp), Kenya (442bp), Nigeria (465bp), Uganda (596) and Zambia (262bp). This all resulted in the overall cumulative outperformance over time. The subsequent subsection demonstrated, through time-series, how these events occurred.

The following countries significantly outperformed their respective equity counterparts: Botswana (76 basis points), Egypt (188 basis points), Kenya (324 basis points), Nigeria (323 basis points), Uganda (418 basis points), and Zambia (417 basis points),

Consequently, the standard deviation of returns of the bond indices were lower in seven out of the 11 countries. This indicated that bonds are a less risky and therefore a safer investment compared to equities, since standard deviation was a proxy for measuring risk of financial assets. Egypt, Kenya, Nigeria, and Uganda all had lower standard deviations despite nominally besting equities returns. Portfolio Management theory has found that investors prefer to invest in riskier investments such as equities if it means that they would be compensated for that risk through superior returns. Egypt, Kenya, Nigeria and Uganda suggest that despite them being a safer investment, they still managed to produce these superior returns. This further supports Auret and Vivian's (2014) comment of how bonds would eventually disappear if equities consistently outperformed them. Just like USA and Europe, corporate bonds in Africa are safer investment and can still relatively hold their own against equities. The table below is an extract

of Tables IV and V's final column, which nominally compare the cumulative performance of both asset classes.

Table VI: Comparison of Cumulative Wealth Index between Equities and Bonds

Country	Equity	Bonds	Winner
South Africa	8.54	3.20	Equity
Botswana	1.00	1.05	Bond
Egypt	0.98	1.42	Bond
Ghana	2.81	1.67	Equity
Kenya	1.50	2.72	Bond
Malawi	8.76	1.53	Equity
Mauritius	1.20	1.17	Equity
Nigeria	1.41	1.75	Bond
Tunisia	1.41	1.00	Equity
Uganda	1.41	3.11	Bond
Zambia	1.87	2.52	Bond

4.2 Coefficient of Variation

The coefficient of variation is a measure that determines the risk per unit of return. This means that the unit value indicates your return of investment once adjusted for risk. Table VII presents the comparison of the coefficient of variation between equities and bonds country, during the respective sample periods. In South Africa (for example), the coefficient of variation for equities (1,64) was lower than bonds (2,81) during their 21-year sample period. This meant that equities had better risk-adjusted returns than bonds. Bonds had better coefficient of variation in six countries compared to equity's five, suggesting that in more than half the case in Africa, bonds were a safer investment and generated better risk-adjusted returns compared to equities. The countries where bonds had better risk-adjusted returns include Botswana, Egypt, Kenya, Mauritius, Nigeria and Uganda. Botswana's bond exhibited a variation of 10,24 compared to its equity's 44,83. Egypt's bonds exhibited a 3,25 compared to its equity's 8,1 while Kenya had a 1,15 bond coefficient of variation to its equity's 3,91.

4.3 Time Series

Despite the Table VI revealing which asset class outperformed its counterpart, it did not necessarily mean that the winner asset class was overall superior. It also did not mean that the winner asset class consistently outperformed its counterpart over their respective sample periods. For an example, Botswana had bond as its overall winner, but it did not necessarily

mean that it stayed superior for its duration. This echoes from Auret and Vivian's (2014) argument against the eventual disappearance of the underachieving asset if its alternative

Table VII: Coefficient of Variation between equities and bonds in Africa

Country	Equity	Bonds
South Africa	1.64	2.81
Botswana	44.83	10.24
Egypt	8.10	3.25
Ghana	1.23	2.41
Kenya	3.91	1.15
Malawi	0.56	1.64
Mauritius	4.23	3.14
Nigeria	12.84	2.98
Tunisia	2.15	41.64
Uganda	4.43	1.13
Zambia	1.92	2.06

exhibited consistent outperformance. This section demonstrates why it would not be essentially a good idea to shun one asset. For some countries in the sample, consistent outperformance was noted but for other countries, there are mixed results. Table VIII and IX respectively depicts the year end returns of equities and bonds of each African country. This is followed by graphs that illustrate time-series of the two financial asset classes overtime.

Table VIII: Year-end returns of African equities.

Year	South Africa	Botswana	Egypt	Ghana	Kenya	Malawi	Mauritius	Nigeria	Tunisia	Uganda	Zambia
2000	-2.64%										
2001	26.91%										
2002	-9.29%										
2003	9.87%										
2004	22.56%										
2005	42.98%										
2006	37.68%										
2007	18.94%							71.33%			
2008	-29.14%							-45.96%		23.37%	
2009	31.34%		35.67%		-0.72%			-33.19%		-4.78%	
2010	16.46%		10.09%		37.27%	-3.92%		20.66%		64.28%	33.36%
2011	-0.41%	8.70%	-44.86%	-3.10%	-30.45%	8.41%		-16.31%		-27.24%	26.21%
2012	23.13%	7.74%	24.55%	22.63%	39.30%	12.03%		34.42%		39.26%	-10.66%
2013	16.12%	20.16%	14.68%	80.33%	42.56%	108.31%	20.96%	44.37%	-3.94%	25.44%	40.49%
2014	8.18%	5.37%	16.72%	6.69%	18.55%	18.79%	-1.00%	-14.42%	16.14%	22.56%	17.32%
2015	3.73%	11.53%	-27.50%	-13.01%	-11.03%	-2.17%	-13.16%	-21.95%	-2.36%	-6.01%	-6.97%
2016	-1.31%	-11.36%	38.63%	-15.07%	-6.43%	-8.53%	0.40%	0.01%	8.86%	-15.07%	-26.55%
2017	17.47%	-5.75%	78.86%	52.73%	28.39%	62.14%	22.02%	42.30%	14.45%	35.44%	26.97%
2018	-11.86%	-11.36%	-14.08%	-3.24%	-17.06%	34.19%	0.53%	-18.84%	15.57%	-18.18%	-1.49%
2019	9.51%	-4.57%	-17.36%	-9.68%	16.49%	1.91%	-1.66%	-14.89%	-2.85%	9.84%	-18.75%
2020	3.04%	-8.18%	N/A	-15.29%	-9.21%	7.02%	-24.97%	46.88%	-2.62%	-28.20%	-7.67%
2021	20.66%	1.89%	N/A	47.13%	8.38%	36.79%	27.35%	7.95%	1.52%	6.89%	42.00%

Table IX: Year-end returns of African Bonds

Year	South Africa	Botswana	Egypt	Ghana	Kenya	Malawi	Mauritius	Nigeria	Tunisia	Uganda	Zambia
2000	-2.95%										
2001	-25.31%										
2002	58.69%										
2003	53.78%										
2004	35.11%										
2005	-1.82%										
2006	-5.32%										
2007	8.42%							15.65%			
2008	-18.77%							-9.97%		-12.44%	
2009	30.60%		0.01%		19.10%			13.87%		20.16%	
2010	28.60%		0.97%		14.18%	7.39%		5.68%		-6.02%	10.57%
2011	-10.90%	-0.61%	1.26%	1.59%	-22.10%	-1.53%		-8.19%		-5.11%	-1.28%
2012	10.94%	5.48%	13.83%	-5.57%	28.98%	3.36%		25.01%		12.57%	17.81%
2013	-18.34%	-0.67%	7.93%	-1.95%	16.01%	6.89%	9.33%	5.11%	-1.02%	24.11%	3.05%
2014	-1.15%	-1.53%	7.93%	-11.98%	8.88%	0.95%	-0.11%	-7.72%	-0.16%	2.38%	-9.23%
2015	-25.70%	-6.06%	6.45%	3.81%	-6.71%	-4.74%	-5.87%	24.96%	0.45%	-12.34%	-31.06%
2016	26.97%	9.83%	-53.65%	13.95%	15.40%	2.56%	5.71%	-39.10%	0.59%	16.26%	38.82%
2017	21.72%	15.65%	21.89%	21.14%	16.08%	11.20%	13.91%	9.96%	0.71%	26.08%	39.62%
2018	-7.41%	-4.65%	11.47%	4.12%	16.16%	1.24%	0.27%	6.96%	0.61%	4.03%	-18.43%
2019	13.43%	5.88%	43.43%	-0.16%	14.37%	5.03%	2.06%	34.98%	0.68%	21.08%	4.20%
2020	3.53%	-1.41%		20.84%	6.68%	12.28%	4.49%	31.26%	-2.39%	14.06%	-14.56%
2021	2.04%	-13.91%		12.27%	6.27%	-0.22%	-11.42%	-21.06%	1.11%	25.60%	116.24%

Returns over time.

Each time series graph depicts a comparison of cumulative returns of each respective African country. Most countries with an equity and bond presence exhibited mixed results. It would showcase that over a short period of time, the bond index would best the equity index however majority of the time, equities would outperform bonds. Some countries such as Egypt, Nigeria and Kenya demonstrated bond outperformance for a large part of their respective sample periods. While other counties, namely Uganda and Mauritius, revealed corporate bonds more or less tracking the equity index. Remember to take note of the differences in sample periods. Not all countries had the same sample periods, dating from 1994. Some only had equity and bond data at the same time from 2000 (such as South Africa), others only had data dating from 2010 (e.g. Ghana). This section analyses the comparative performance of equities and bonds of the eleven African countries that both inhabit an equity and corporate bond presence.



Figure 3: Cumulative returns of Equities and Bonds of South Africa

Figure 3 show that by large part, the equity index outperformed the bond index in South Africa. Initially, when the bond index was introduced, it managed to match equity returns and even went as far as outperforming equities in the early 2000s. However, this matched performance ended in 2006, the genesis of the JSE's All Share growing dominance. The margin between the equity and bond index continued to grow exponentially all the way through to December 2021, where Equities achieved 8,55-times cumulative return versus its Bond 3,22. The correlation coefficient of South Africa's financial assets was 0.76.

It is to take note that the JSE Top 40 makes up over 80% of South Africa's JSE market capitalisation at any point in time. The total number of firms listed in South Africa amounts to 400 listed firms. The dominant presence of South Africa's top 40 firms is what drives the equity JALSH Index dominance to the corresponding bond market.

The corporate bond market was born in 1992, with its first issue taking place. Since then, more than 1500 debt instruments have been listed (JSE, 2023). The JSE has informed that the liquidity of corporate bonds is lower than the government bonds traded in South Africa.



Figure 4: Cumulative returns of Equities and Bonds of Botswana

Figure 4 compares the securities in Botswana, between 2012 and 2018. Botswana's equity index exhibited a consistent outperformance to bonds for six years of its sample period. However, despite the constant outperformance, there was a shift in dynamic between the two asset classes. In 2016, the MSCI Botswana Index started to yield negative cumulative returns while its bond counterpart experienced growth; allowing it to catch up and eventually surpass the equity index. By 2018, the bond index managed to match and eventually outperform the equity index all the way through to December 2021. The substantial growth of the bonds from 2016 could potentially be a result of increased corporate bond issuances (Muzhoba, 2021).



Figure 5: Cumulative returns of Equities and Bonds of Egypt

Figure illustrated that for the most part between 2010 and 2017, Egypt's bonds managed to consistently best its equities. However, from 2017, the bond index experienced an astronomical drop in cumulative returns while the equity index experienced exponential growth. Possible reason behind this is Egypt's bonds' reputation of having hefty interest rates. The 91-day T-bill rate of the country as of December 2021 was an unusual 13,55%. Additionally, the sudden drop in cumulative returns of bonds in Egypt was due to political unrest, violent protests, and a 48% currency devaluation against the dollar thus reducing confidence in bond investments.



Figure 6: Cumulative returns of Equities and Bonds of Ghana:

In Figure 6, Ghana's equity index experienced a significant spread from its bond counterpart despite its movement being more volatile. However, for an incredible short period of a couple of weeks, the bond index managed to outperform the equity index. One of the key drivers behind Ghana's economy are oil and gas. The oil industry in Ghana is a significant contributor to Ghana's equity index (IMF, 2023). This could suggest the consistent outperformance of equities because of their increased production. Ghana's equity market experienced heavy fluctuations, including declines during 2020. The reason behind Ghana's slump post-2020 was the drop in oil prices (there was a lower demand for oil) and supply chain deceleration, caused by the COVID-19 pandemic.

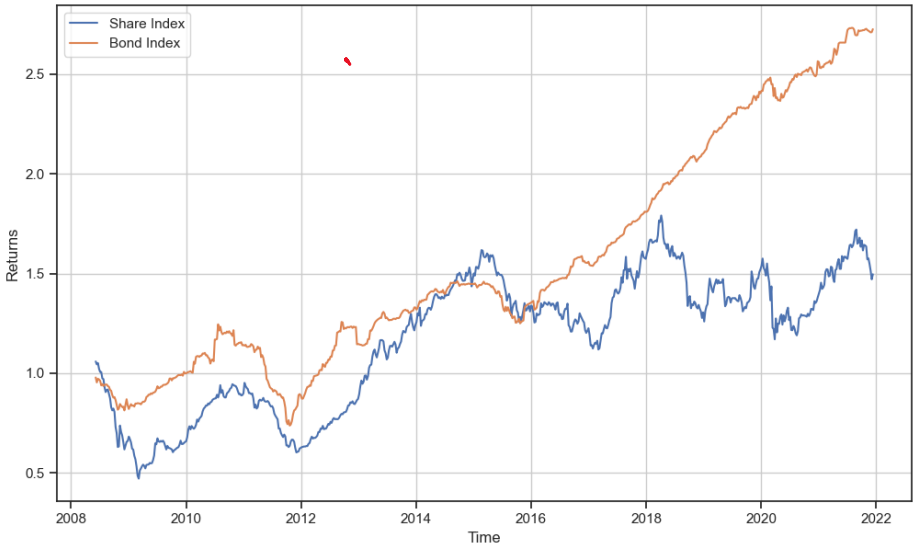


Figure 7: Cumulative returns of Equities and Bonds of Kenya

Figure 7 focuses on Kenya's bond index bested its equity index for the majority of its 13-year sample period. From 2008 to 2015, the bond index outperformed the equity index, only experiencing a drop in cumulative performance in 2015, when the equity market's returns surpassed the bond market. However, that outperformance was short-lived, when the bond index enjoyed a near-vertical linear performance, while the equity index underwent a volatile period, allowing the spread to grow exponentially during the latter period of the sample resulting in a 2,72 versus 1,5 respective cumulative performance. Kenya ended of 2022 with a 181% spread in cumulative returns.

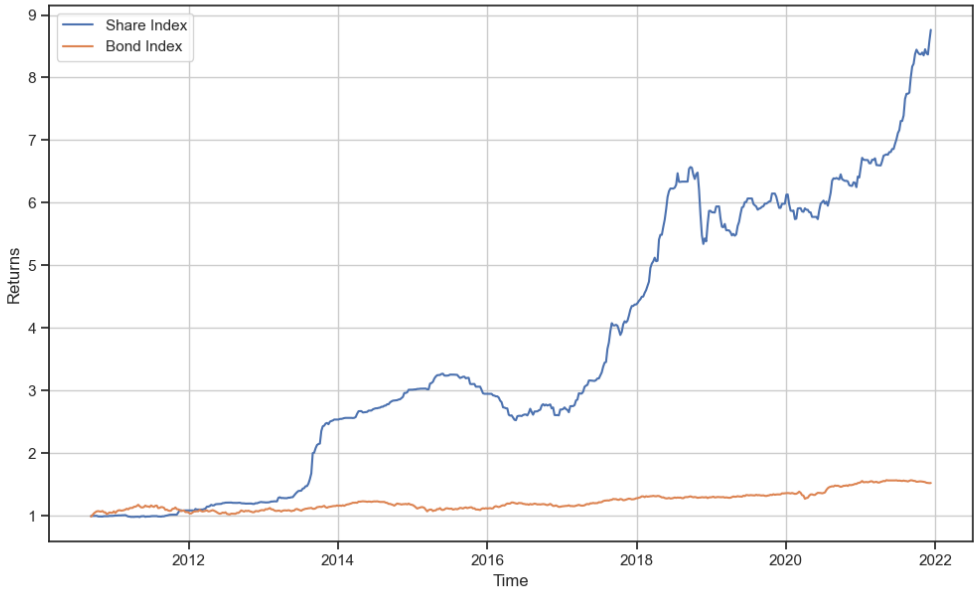


Figure 8: Cumulative returns of Equities and Bonds of Malawi

During Malawi's 10-year sample period (Figure 8), the equity index achieved enormous growth, resulting in an 8,76 cumulative wealth index meanwhile the bond counterpart underwent a relatively stable return period, only achieving an index return that was 5,7 times smaller to the MASI index (1,53). Malawi is an agriculturally based economy (JICA, 2022) with over a third of its GDP and 80% of its export stems for agriculture however, most of Malawi's listed firms are from the financial sector. These companies are what drive Malawi's equity performance.



Figure 9: Cumulative returns of Equities and Bonds of Mauritius

In Figure 9, Mauritius experienced mixed results during its 9-year sample period. Between 2013 and 2016, Mauritius's equity managed to outperform bonds however, they did illustrate some co-movement. The bond index managed to best the equity index during the 2016 period but then was later bested again equities from 2016 to 2020. Despite the underperformance of bonds between 2016 – 2020, the bond index managed to closely track its counterpart. 2020 was when equities and bonds did a relatively radical switch in cumulative performance. The corporate bond market beat the equity market by a large margin before the equity market started to recover and display marginal outperformance. The radical drop in cumulative performance during 2020 may be due to the reaction of investors after the announcement of COVID-19 pandemic.



Figure 10: Cumulative returns of Equities and Bonds of Nigeria

Nigeria displayed a similar story to Kenya where bonds consistently outperformed equites for the majority of its sample period. In Figure 10, the bond index exhibited superior cumulative returns (except for 2008 and 2009)



Figure 11: Cumulative returns of Equities and Bonds of Tunisia

Figure 11 showed that from 2013 to 2021, Tunisia experienced superior yet more volatile cumulative equity index returns compared to its bond counterpart that experienced a near horizontal, flat return over the sample period. By the end of the sample period, Tunisia experienced a 1.002615 wealth index with a near zero volatility of 0,29% standard deviation. Meanwhile the equity counterpart exhibited a 1,4-wealth index with a 1,41% standard deviation.



Figure 12: Cumulative returns of Equities and Bonds of Uganda

Uganda illustrated mixed results in its time-series. The time-series in Figure 12 ranged from marginal to slightly significant spreads between the two asset classes, with equities mainly outperforming bonds. However, from 2019, Uganda's bond index outperformed its All Share index by 121% (3,11 bond vs. 1,41 equity).



Figure 13: Cumulative returns of Equities and bonds of Zambia

Like most of the African countries described above, the equity index of Zambia in Figure 13 outperformed the bond index for most of the sample period. However, in the rear months, the bond index experienced outperformance to equities.

Correlations

Table X is a correlation matrix which presents the cross-correlations of the equity series in Africa. Due to the economic partnerships, geographical proximity, cultural similarity and trade, one would expect a co-movement in returns in the continental region. Ibbotson et al (1982) noted their study that countries that were geographically close to each other and countries that shared similar cultures exhibited similar returns.

Table X too suggests that with mainly positive correlations amongst the sample nations. Out of the 105 correlations, only eight were reported as negative. This means that there was a positive correlation for 92,38% of the time, there was a positive co-movement amongst the 11 sample nations. About 61,9% of the correlations reported to be over 50%, signalling a strong co-movement. Moreover, of the correlations that posed to be over 50%, 50,7% of them reported to have a correlation coefficient of over 80%.

Geographical proximity

Countries with geographical proximity such as South Africa, Botswana, Malawi and Zambia (Southern African nations), reported to have strong co-movement and it could be argued that it is due to geographical proximity. The central and east African Nations (Kenya, Uganda, Zambia and Mauritius) also reported strong correlations with Kenya having a 0,91 and 0,8 coefficient with Uganda and Zambia respectively. Furthermore, similar results mainly applied to the North African nations – Egypt, Morocco and Tunisia. They respectively had strong correlations of over 0,5 except for Tunisia and Egypt which reported a 0,42 correlation.

However, there were countries that had weaker correlations despite the geo-proximity advantages. Nigeria and Ghana reported a weaker 0,24 coefficient despite these countries being strategically close to each other, sharing the western African sub-region.

Cultural similarities

Nations with cultural similarities such as Egypt, Tunisia and Morocco shared strong positive co-movements. Their North African, Arabic-Persian roots could suggest the reason behind their co-movement. French speaking nations such as Morocco, Mauritius and Burkina Faso also presented strong positive correlations.

Nigeria and Ghana's cultural similarities did not justify the weaker correlation between the two west African economic powerhouses. The reason behind this are their worsened political and economic relations (Oxford Business Group, 2021). In 2010, Ghana was Nigeria's third largest trading partner however, as time progressed, Ghana is not even in their top five largest trading partners (International Trade Centre, 2014). This all stemmed from turmoil that dates to the 1970s.

Table X: Cross-correlations of Annual Returns of Equities between 1994 - 2021

Series	South Africa	Botswana	Egypt	Ghana	Kenya	Malawi	Mauritius	Nigeria	Tunisia	Uganda	Zambia
South Africa	1.00										
Botswana	0.79	1.00									
Egypt	0.41	0.10	1.00								
Ghana	0.23	0.25	-0.75	1.00							
Kenya	0.93	0.48	0.51	N/A	1.00						
Malawi	0.89	0.51	0.59	0.37	0.78	1.00					
Mauritius	0.91	0.90	0.48	0.42	0.63	0.71	1.00				
Nigeria	0.64	0.65	0.48	0.24	0.43	0.46	0.73	1.00			
Tunisia	0.92	0.74	0.42	-0.05	0.73	0.89	0.89	0.47	1.00		
Uganda	0.89	0.78	0.37	0.28	0.91	0.70	0.83	0.26	0.82	1.00	
Zambia	0.92	0.90	0.30	0.39	0.80	0.71	0.96	0.73	0.86	0.89	1.00

Table XI: Cross-correlations of Annual Returns of bonds between 1994 - 2021

Series	South Africa	Botswana	Egypt	Ghana	Kenya	Malawi	Mauritius	Nigeria	Tunisia	Uganda	Zambia
South Africa	1.00										
Botswana	0.49	1.00									
Egypt	-0.04	-0.17	1.00								
Ghana	0.55	0.70	0.25	1.00							
Kenya	0.37	0.76	0.39	0.85	1.00						
Malawi	0.28	0.72	0.43	0.87	0.94	1.00					
Mauritius	0.48	0.92	-0.06	0.76	0.84	0.81	1.00				
Nigeria	0.24	0.13	0.76	0.43	0.59	0.56	0.17	1.00			
Tunisia	0.18	0.36	-0.16	0.45	0.36	0.30	0.37	-0.07	1.00		
Uganda	0.39	0.67	0.46	0.88	0.97	0.96	0.76	0.60	0.31	1.00	
Zambia	0.50	0.43	-0.15	0.54	0.46	0.47	0.39	-0.03	0.26	0.54	1.00

Correlations between equities and bonds

Table XII: Correlations of Equity and Bonds in Africa

Country	Correlation Coefficient
South Africa	0.76
Botswana	-0.50
Egypt	-0.49
Ghana	0.37
Kenya	0.75
Malawi	0.92
Mauritius	0.09
Nigeria	0.01
Tunisia	0.44
Uganda	0.39
Zambia	0.12

Table XII and Appendix I exhibit the correlation coefficient of equities and bonds between eleven countries examined in the sample. Ibbotson et al (2012) reported that if asset returns are imperfectly correlated, risk is reduced at a given level of expected. None of the correlations between the equity and bond market of each country was perfectly correlated. The financial market that experienced the closest to a perfect correlation was Malawi, who had a 0,92-correlation coefficient, this was followed by South Africa and Malawi who respectively had correlations of 0,76 and 0,75. Out of the 11 counties that possess both equities and corporate bonds, nine of them presented a positive correlation coefficient between their respective two financial asset classes. Botswana and Egypt were the only two countries that had negative correlations, reporting coefficients of -0,5 and -0,49 respectively. Of the nine countries with positive correlations, only three (33,33%) of the countries, reported correlations of over 0,5 – with Malawi having the highest of 0,92. Two counties had near-zero correlations, being Mauritius (0,09) and Nigeria (0,01). These reports of equity-bond correlations support Auret and Vivian's (2014) argument that if one financial asset class frequently outperforms other asset classes, the other asset classes would eventually disappear. The reports of equities outperform bonds in most countries and the lack of near-perfect co-movement suggests that one could diversify one's investments perfectly and achieve active, abnormal returns. With Botswana and Egypt's negative correlations, one could be encouraged to diversify in these countries.

Table XIII: Year End Cumulative Returns of Equities

Year	South Africa	Botswana	Egypt	Ghana	Kenya	Malawi	Mauritius	Nigeria	Tunisia	Uganda	Zambia
2000	0.97										
2001	1.24										
2002	1.12										
2003	1.23										
2004	1.51										
2005	2.16										
2006	2.97										
2007	3.53							1.20			
2008	2.50				0.66			0.65		0.77	
2009	3.29		0.95		0.65			0.43		0.74	
2010	3.83		1.05		0.90	1.00		0.52		1.21	1.10
2011	3.81	0.99	0.58	0.97	0.63	1.09		0.44		0.88	1.39
2012	4.70	1.07	0.72	1.19	0.87	1.22		0.59	0.92	1.23	1.24
2013	5.45	1.29	0.83	2.14	1.24	2.54	1.21	0.85	0.88	1.54	1.75
2014	5.90	1.36	0.97	2.29	1.47	3.02	1.19	0.73	1.03	1.88	2.05
2015	6.12	1.51	0.71	1.99	1.31	2.95	1.04	0.57	1.00	1.77	1.91
2016	6.04	1.34	0.99	1.69	1.23	2.70	1.04	0.57	1.11	1.50	1.40
2017	7.10	1.26	1.77	2.58	1.57	4.38	1.27	0.81	1.27	2.04	1.78
2018	6.25	1.12	1.52	2.50	1.30	5.87	1.28	0.65	1.46	1.67	1.75
2019	6.85	1.07	1.25	2.25	1.52	5.99	1.26	0.56	1.42	1.83	1.42
2020	7.06	0.98		1.91	1.38	6.41	0.94	0.82	1.38	1.32	1.31
2021	8.55	1.00		2.81	1.50	8.76	1.20	0.88	1.41	1.41	1.87

Table XIV: Year End Cumulative Returns of Bonds

Year	South Africa	Botswana	Egypt	Ghana	Kenya	Malawi	Mauritius	Nigeria	Tunisia	Uganda	Zambia
2000	0.97										
2001	0.72										
2002	1.15										
2003	1.77										
2004	2.39										
2005	2.35										
2006	2.22										
2007	2.41							1.16			
2008	1.96				0.84			1.04		0.88	
2009	2.56		1.00		1.00			1.19		1.05	
2010	3.29		1.01		1.14	1.07		1.25		0.99	1.11
2011	2.93	0.99	1.02	1.02	0.89	1.06		1.15		0.94	1.09
2012	3.25	1.05	1.16	0.96	1.15	1.09		1.44	1.00	1.06	1.29
2013	2.65	1.04	1.26	0.94	1.33	1.17	1.09	1.51	0.99	1.31	1.33
2014	2.62	1.03	1.36	0.83	1.45	1.18	1.09	1.39	0.99	1.34	1.20
2015	1.95	0.96	1.44	0.86	1.35	1.12	1.03	1.74	0.99	1.18	0.83
2016	2.47	1.06	0.67	0.98	1.56	1.15	1.09	1.06	1.00	1.37	1.15
2017	3.01	1.22	0.82	1.19	1.81	1.28	1.24	1.17	1.00	1.72	1.61
2018	2.79	1.17	0.91	1.24	2.10	1.30	1.24	1.25	1.01	1.79	1.31
2019	3.16	1.24	1.30	1.23	2.40	1.36	1.27	1.69	1.02	2.17	1.37
2020	3.27	1.22		1.49	2.56	1.53	1.32	2.21	0.99	2.48	1.17
2021	8.55	1.00		2.81	1.50	8.76	1.17	1.75	1.00	3.11	2.52

4.5 Diversification

As stated above, Ibbotson et al (2012) reported that if asset returns are imperfectly correlated, risk is reduced at a given level of expected return. Additional authors such as Lessard (1974) and Solnik (1974) and Asness (2011) support this notion. The non-perfect correlations that were examined above in Table XII were low for most countries examined in the sample. This indicates that if an investor diversifies well between equities and bonds in the African market, he could experience active returns. In addition, six of the cases, bonds outperformed equities, while equities outperformed in the remaining five cases in the compound, mean and cumulative return categories; meaning that if one longs bonds and equities in the respective equity/bond dominant nations, one could internationally experience superior, active returns.

Furthermore, the correlations in Table X and XI between equities and bonds, cross border, suggest that one could hedge their risk exposure by diversifying internationally. For an example, Ghana and South African had correlations of 0,23 in the equity category and 0,55 in the bond category. If one was to take advantage of the correlations and diversify between the two nations, they would reduce their 12% annual risk exposure, hedge from potential financial loss and potentially produce substantial gains.

Table XX: Portfolio Weightings per country

Country	Share Index	Bonds Index
South Africa	79.71%	20.29%
Botswana	13.4%	86.6%
Egypt	2.68%	97.32%
Ghana	70.33%	29.67%
Kenya	3.91%	96.09%
Malawi	63.11%	36.89%
Mauritius	23.08%	76.92%
Nigeria	0.29%	99.71%
Tunisia	99.76%	0.24%
Uganda	6.16%	93.84%
Zambia	68.46%	31.54%

Moreover, Table XX (above) suggests that overall, there is not necessarily one superior asset class throughout the African sampled region. The table looked at the optimal portfolio weightings between both asset classes of each country based on 1000 different portfolio variations. It looked at optimal portfolio weightings of each region, between each asset class, using the Sharpe ratio. Over the sample period, five countries resulted in an advised heavier (>50%) weighting on the share index. The remaining six countries opted for a bond weighting preference. This supports studies indicating that there are no superior assets historically, there were no eventual disappearances of one asset class. The results of the portfolio weightings also do not make it clear of if there is a clear superior asset class as addressed in the hypothesis.

5 CONCLUSION AND RECOMMENDATIONS

Earlier studies have pointed out that equities and bonds make up the largest proportion in the international financial markets. The study branches off Ibbotson et al (1982), Auret and Vivian (2014) and Mutize and Gossel (2018) and Doeswijk et al (2020); who studied the relationship between the two financial asset classes internationally and within Africa respectively. This study explored the gap of literature that overlooked the examination of the dynamics of the two asset classes across Africa, with an emphasis on outperformance and correlation behaviours. It is possible that Africa may have been overlooked in this study for decades because of its relatively small size financial market compared to the rest of the world. Auret and Vivian (2014) merely focused on South Africa and Mutize and Gossel (2018) looked at equities and bonds in Africa but in the context of credit ratings.

This study was a quantitative analysis, providing an overall picture of the dynamic between the two largest financial assets, with purpose of determining the superior asset class. It looked at returns, correlations and various ratios to provide finance professionals a broad understanding of Africa's financial markets. The two major findings were that bonds outperformed equities in more than half the countries. This contradicted the first hypothesis of this study that equities likely outperform bonds. The second result was that no asset perfectly correlated with the other in any of the sample countries examined. This supported the second hypothesis that "Equities do not perfectly correlate with bonds". Furthermore, the lack of perfect co-movement means that international diversification is plausible.

However, the empirical study did pose a number of limitations. Firstly, weekly data in the study was limited. The initial aim was to obtain 27 years of data of 19 countries but due to data availability at the time, it was only possible to obtain data of 11 countries – whom had the presence of both an equity and bond market and even so, the time periods varied. This meant that the data could potentially not be enough to have a thorough outlook of Africa's financial market though it could be a starting point for further examination.

Lastly, the study lacked reasoning behind the behaviours of its returns. This could have potentially provided more focus on the paper. Thus, it would be recommended to expand the study by exploring the effect of various economic indicators on the correlations of the two asset classes through multi-regression models. It could explain why outperformances and imperfect correlations existed in the analysis. Further exploration on inflation, for an example, could be explored when analysing the dynamics of equities and bonds.

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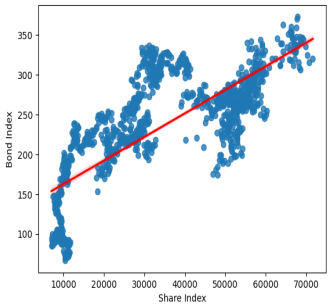
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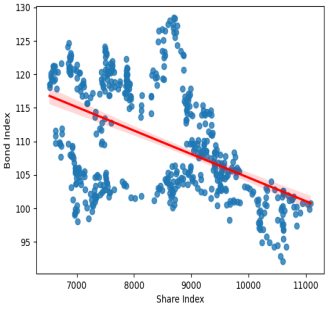
7 Appendix

Appendix 1: Linear regression scatter plot illustrating correlation between Share Index and Bond Index

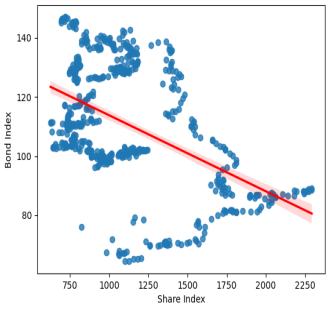
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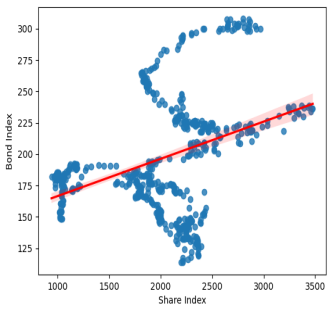
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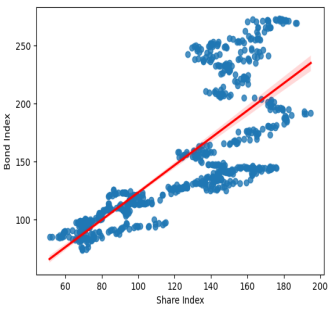
Egypt



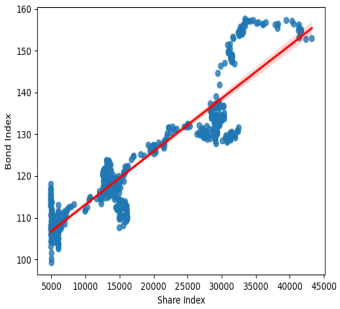
Ghana



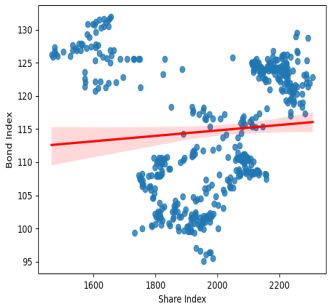
Kenya



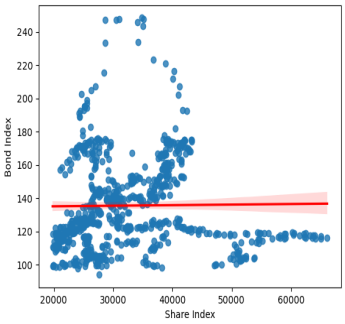
Malawi



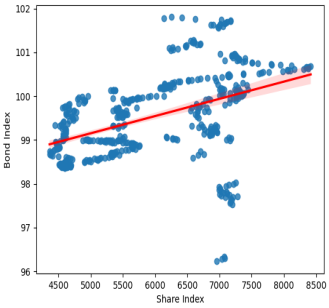
Mauritius



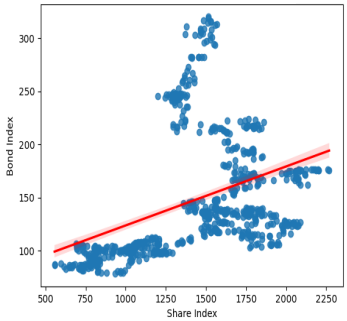
Nigeria



Tunisia



Uganda



Zambia

