International Journal of
Finance
(IJF)

Impact of Gross Domestic Product on the Growth of Bond Markets in Kenya

CARI Journals

International Journal of Finance
ISSN 2520-0852 (Online)
Vol. 7, Issue No. 6, pp 37 - 58, 2022
www.carijournals.org

Impact of Gross Domestic Product on the Growth of Bond Markets in Kenya

Linet Moraa Amenya
PhD Student - JKUAT
P.O.BOX 62,000-00200, Nairobi, Kenya
Email: linmoraa2003@gmail.com
Prof Willy Muturi
Professor, Department of Economics, Accounting & Finance
Jomo Kenyatta University of Agriculture & Technology
P.O.BOX 62,000-00200, Nairobi, Kenya
Email: wmuturi@jkuat.ac.ke
Dr. Oluoch Oluoch
Lecturer, Department of Economics, Accounting & Finance
Jomo Kenyatta University of Agriculture & Technology
P.O.BOX 62,000-00200, Nairobi, Kenya
Email: josephat.oluoch@jkuat.ac.ke
Dr. Assumpta Kagiri
Lecturer, Department of Economics, Accounting & Finance
Jomo Kenyatta University of Agriculture & Technology
P.O.BOX 62,000-00200, Nairobi, Kenya
Email: akagiri@jkuat.ac.ke

Abstract

Purpose: Bond markets are an example of financial markets that are very essential in promoting greater economic efficiency by channeling funds from savers to investors. This study investigated the influence of gross domestic product on growth of bond market in Kenya. The study further examined the moderating effect of diaspora remittance on the relationship between gross domestic product and the growth of bond market in Kenya.

Methodology: Secondary data was obtained from the CBK, KNBS and NSE and covered a period of 20 years. Time series regression analysis was used in the study. The study employed descriptive research design.

Findings: The study established that the gross domestic product had a major effect on the growth of bond market for the period of study. The study findings revealed that the GDP had a strong positive influence on the growth of bond markets. After moderation the effect improved more with the significance p-value. The study concluded that there was a positive statistically significant effect of GDP on bond market growth in Kenya.

Unique Contribution to Theory, Policy and Practice: The study recommended that the capital market authority as a policy maker should enhance policies that promote investment in the bond market. Further studies should also be carried out incorporating other macroeconomic variables not included in this study. Finally, the study also recommended that CBK should ensure that it improves on measures that control the GDP and diaspora remittance as they influence the growth of bond market.

Keywords: *Gross Domestic Product, Bond Market Growth, Diaspora Remittance*

1. INTRODUCTION

1.1 Background of Study

Financial markets are markets where transactions of financial assets such as bonds, debentures, shares and many other instruments occur. It can be defined as a market place where funds are transferred from people who have it in excess to people who are in demand of the same funds. A sound performing financial market is a significant aspect in producing high economic growth and vice versa. (Cournède & Denk, 2015). The growth of bond markets contributes to the economy by providing an efficient economic system. Bond markets offer an alternative channel that governments and private sector organizations utilize to mobilize funds for purposes of financing long-term projects and budgetary deficit.

Bond market is a financial market where trading of debt securities occurs (Fabella & Madhur, 2003). Bonds are medium to long-term debt securities referred to as financial debt instruments issued by firms and governments to raise large amounts of funds. Bonds are divided into two that is treasury bonds and corporate bonds that requires the issuer to pay the lender the amount borrowed plus interest over a specified period of time (Welch, 2009). The bond market provides several advantages in addition to its positive influence in the development of an economy and financial system, this makes it remain critical to a country`s financial system and economy (Mishkin, 2010).

The Kenyan bond market plays a pivotal role in fostering economic development in the country through offering investment opportunities to both local and foreign investors in addition to financing government budget deficit. In developed countries like United States of America, bond statistics indicates that the bond market is dominated by the developed countries. The US bond market comprised of 39% of the world value of outstanding domestic bonds and its market is well diversified with products for example mortgage-backed securities, federal agency securities, corporate and treasury bonds (Ganatra, 2016).

The size of the world bond market as at 2021 was estimated to be at 119 trillion US Dollars out of which 46 trillion US Dollars were from United States market. It is then followed by the country of Japan (18%), United Kingdom (UK) and finally emerging markets follow closely (Kibua, 2019). The European bond capital market was estimated to comprise of 802.6 billion US dollars out of these 2 billion US dollars were from United Kingdom market (ECM, 2021). The sub-Saharan Africa bond market was estimated to have a size of 300 billion US dollars, out of which only 6.9186 billon were from the Kenyan bond market (CMA, 2020).

According to Galang and Kalui (2015) a desirable bond market growth needs to exhibit stable macroeconomic variables, transparency, efficiency, minimal transaction costs and low inflation volatility. Due to deficiency of these attributes in Kenyan market, there is always inadequacy of financial resources available for funding infrastructure projects on a long-term basis. As a matter of fact, the gross domestic product has greatly influenced the growth of Kenyan bond market and

investors in this market need enough data to rely on for making wise investment decisions (Njihia, 2015) and (Riungi, 2016).

Most emerging bond markets including Kenyan market are characterized by weak regulatory framework, unstable macroeconomic environment like inflation volatility, and weak corporate mechanism. This makes foreign and local investors' lack confidence in trading of debt securities (Kemboi & Tarus, 2012). The growth of bond markets has been greatly influenced by numerous macroeconomic variables all over the world and particularly in Kenya. These variables include the inflation rate, interest rate, bond market size, money supply, direct foreign investment, gross domestic product among others (Sprcic & Wilson, 2007

Gross Domestic Product (GDP) is the real market value of the aggregately recognized finished goods and services that have been produced within a country in a given period (Schiller, 2008). Mwangi (2013) states that GDP is the most commonly used macroeconomic indicator to measure total economic activity within an economy. The growth rate of the GDP reflects the state of the economic cycle. GDP is measured either with the income approach or the expenditure approach. GDP is considered the broadest indicator of economic growth and economic output.

Diaspora Remittances are the transfers of money, goods and services by migrants or migrant groups back to their countries of origin (Oucho, 2008). Kenyans in the Diaspora are constantly sending money home into their country. This money could therefore be used for investments and to support their family members among other reasons. This is therefore called by experts as money or the diaspora remittance (Muiruri, 2015). Theoretically, there is a positive relationship that exists between bond market growth and economic development However, there is little evidence to confirm any causal relationship between the inflows of remittances and the growth of bond market and other various key segments in the Nairobi securities exchange (Alajekwu, 2012).

Kenya has always had a scarcity of financial resources available for funding infrastructure development projects on a long-term basis. This is a justification that, there is need to rely on other sources like bonds and concessions derived from private sector participation to actualize the national government agenda. Consequently, it is clear that both the growth of government bond markets and the corporate bond markets are critical to stimulating economic growth particularly in developing economies like Kenya. This study will therefore seek to fill this gap by establishing the influence of GDP on growth of bond markets in Kenya.

1.2 Statement of the Problem.

The growth of bond markets contributes to the economy by providing an efficient economic system. It also attracts foreign investors due to greater investment opportunities and hence deepening the financial markets. The fundamental role of growth for bond markets is to promote the government and private sectors during the growth process (Kahn, 2005). Bond markets offer

an alternative channel that governments and private sector organizations utilize to mobilize funds for purposes of financing long-term projects and budgetary deficit (Nzotta & Okereke, 2009).

In sub–Saharan Africa, the bond market growth is expected to make an important contribution to economic growth and efficiency of financial markets. Several countries in sub-Saharan Africa for example; Kenya, Namibia, Mauritius and South Africa have pursued strategies to lengthen the maturities of their government bonds up to 10 and 15 years. This has been done in order to meet the growing demand for longer dated securities from nonbank institutional investors (IMF, 2008). In the year 2019 the percentage growth rate of the bond market in these countries were; Kenya 14.2%, Mauritius 56.2%, Namibia 74% south Africa 50.7% (Janet, 2019). This indicates that Kenya experience poor growth rate as compared to other sub-Saharan counties.

Data recorded between 2016 and 2019 on the value of the bond market includes the following, 506.25, 305.10, 433.12 and 435.39 billion Kenyan shillings respectively. From this information, it can be concluded that the turnover decreased by 66% in year 2016 to 2017, the turnover increased by 30% in the year 2017-2018 and finally increased by 0.64% in the year 2018-2019 (CMA, 2019). From this information, it could be concluded that, the growth rate in the Kenyan bond market is unstable and this may occur as a result of macroeconomic variables instability

As at December 2019 the companies registered in the in Kenyan bond market stood at 24 while in South Africa and Middle East countries like Malaysia stood at 32 and 48 companies respectively (Yahya, Rahi & Rashid, 2016). This depicted low participation of investors in the bond market. This occurs as a result of unstable macroeconomic variables like low GDP leading to poor growth at the bond market. The small involvement by the private sector in the Kenyan market also poses as a constraint on the bond market growth. This is evidence that investors in this sector lack enough data to rely on to make wise decisions on investment portfolios. (ADB, 2016).

Kenya has always had a scarcity of financial resources available for funding infrastructure development projects on a long-term basis. This is a justification that, there is need to rely on other sources like bonds. Consequently, it is clear that both the growth of government and corporate bond markets are critical to stimulating economic growth particularly in developing economies like Kenya. This study therefore sought to fill this gap by establishing the influence of macroeconomic variables on growth of bond markets in Kenya.

1.3 Objective of the Study

The general objective of the study was to examine the influence of macroeconomic variables on growth of bond markets in Kenya.

The following were the specific objectives which guided the study;

i. To assess the influence of GDP on growth of bond markets in Kenya.

ii. To evaluate the moderating effect of diaspora remittance on relationship between GDP and growth of bond markets in Kenya.

1.4 Literature Review

Fink, Hasiss and Hristoforova (2013) investigated the relationship between the development of the aggregate bond markets and real GDP in 13 highly developed economies comprising United States of America, United Kingdom, Switzerland, Germany, Austria, and Netherlands. The study covered a span period of from the year 1950 to 2000. The authors of this study initially treated unit root and co-integration of the study variables. Afterwards, a VAR model of first differences with a maximum lag length order of a period of four years was applied to the seven countries. Empirical evidence in the study for long run equilibrium convergence and interdependence in Japan, Italy, Finland, and Portugal assumed that real GDP and the size of the bond market follow a common stochastic trend in the long run while evidence from autoregressive models in the short run supports the supply leading assumption.

Said (2013) investigated further evidence on the relationship between debt market and economic growth. The author finds lack of empirical study on effect of bond market on economic growth, whereas, studies on the relationship between stock market and growth has attracted much more research attention. The researcher considered three categories of debts in the analysis of this study using data from china, Hong Kong Japan, South Korea, and Thailand. Secondary data covering the period between 2002 and 2009 was employed to establish the actual relationship among the variables. In this study vector of control variables, panel regression analysis was also estimated. The study finally concluded that public and private debt contributed significantly positive to the growth of the economy to the region. The author found that robust issuance of public and private debts in the Asian region following the 1997 financial crisis enabled this region to recover from the same crisis and consequent contribution to economic growth.

Smaoui, Grandes and Akindele (2016) investigated on the Determinants of Bond Market Development on Emerging and Developed Countries. This study empirically investigates the structural, financial, developmental, institutional, and macroeconomic determinants of bond market development for a sample of 22 emerging and developing countries over the period from 1990 to 2013. The study employed both the Prais-Winston and system GMM procedures to tackle the problems of endogeneity among the explanatory variables. The study employed secondary data that was obtained from published reports. The study found that a combination of structural, financial and institutional factors to exert a significant effect on bond markets. Indeed, economic size, trade openness, investment profile, GDP per Capita, bureaucratic quality, and size and concentration of banking system are positively affects the growth of bond market.

Ahwireng-Obeng (2016) established the performance determinants of local currency bond markets in African emerging economies. This study outlines the characteristic and features of the African financial system between 2005 and 2013. Using macroeconomic, social, institutional and

historical data on local currency bond market from 26 African economies and 49 listed firms. The results suggest that from a macroeconomic perspective, inflation, central government debt, GDP, external debt, GDP per capita and fiscal balance are important drivers of local currency bond market development in African economies.

Alhassan Musah, (2019) examined the influence of bond market determinants on the development of the bond market in Ghana. The study Data was collected from secondary sources covering a period from 1980 to 2015. Vector Error Correction Model (VECM) was employed as data analysis technique. The Augmented Dickey-Fuller (ADF) stationarity test, the Johansen Co-integration test and other tests were carried out to ensure the robustness of the results. The findings of the study revealed that bank size, external debt, money supply and size of the economy are significant determinants of corporate bond market development in Ghana. Also, level of economic development, budget deficit and bank size are significant determinants of government bond market size in Ghana. However, bank size, money supply and external debt are seen to be the most important and significant drivers of total bond market size in Ghana.

Kapingura and Makhetha-Kosi (2014) investigated the casual relationship between bond market development and economic growth in Africa using South Africa. The study covered a period from 1995 to 2012. The researchers in this study the employed Engle and Granger Single-equation based two- step approach to test if the two variables are co-integrated after carrying out statistical and time series of the data set using the Augmented Dickey-Fuller (ADF) and Phillips –Perron (PP). Empirical results from the study found a unidirectional causal relationship between bond market and economic growth successively from bond market to economic growth.

Nyakeri (2012) conducted a study on the relationship between selected macroeconomic variables and bond yield on the Nairobi Securities Exchange. Though it is assumed that government economic policy and macroeconomic variables such as the interest rates, inflation rates, Gross Domestic Product (GDP), GDP growth rates and exchange rates are external to organizations and have a significant influence on the movement of security prices. The study seeks to establish the relationship between bond yield to maturity and selected macroeconomic variables in Kenya for a period of five years that is from January 2007 to December, 2011. The study used secondary data that was obtained from NSE, CBK reports & publications and annual economic survey reports. The finding of the study indicates that macroeconomic variables example the GDP do not a have a significant influence on performance of bonds. However, policy makers should develop and implement prudent macroeconomic policies that will promote development of the capital market in Kenya particularly the bonds market.

Githinji (2013) investigated the effect of Selected Macro-Economic Variables on Bond Market Development in Kenya. The study variables include the following; economic size, exports, interest rate variability, fiscal policy and GDP per capita. A causal research design was used in this study. Secondary data was used to model the macroeconomic factors influencing

development of the bond market. The study targeted the entire bond market in Kenya. The study used secondary data that covers a period of four years from 2008 to 2012. The study finds found out that GDP per capita and GDP at purchasing power parity had a negative influence on the development of bond market these were concluded from the coefficients of the model. It is therefore recommended that more focus should be given, on the four main variables identified, by the policy makers in order to spur more growth in the bond market.

A study conducted by Koka, (2012) on the relationship between issuance of treasury or government bond and economic growth in Kenya. The study employed secondary data covered a span period of five years from 2003 to 2011. The study explored the causal relationship between gross domestic products, market capitalization of bonds, and value of bonds traded and total new issues of bonds. The researcher found that that issuance of government bonds has a positive influence on the level of economic growth in Kenya.

Walsh (2011) analyzed whether phases of fast infrastructure investment are considerably different from episodes of slower investment. They look at four key factors: association between infrastructure booms and rapid GDP growth, link with increases in savings and their origin, foreign or domestic, link with fiscal deterioration; and link with deepening financial markets. Using annual data for macroeconomic performance and infrastructure construction with observations from 1980 to 2009 for 105advanced and emerging economies, they find that rapid economic growth has a tendency to go hand in hand with growth in infrastructure investment. Specifically, it appears that increases in energy capacity tend to be funded domestically, while investment in roads is less likely to be undertaken without the contribution of foreign capital. They find evidence that private capital markets tend to expand during periods of infrastructure investment.

1.5 Conceptual Framework

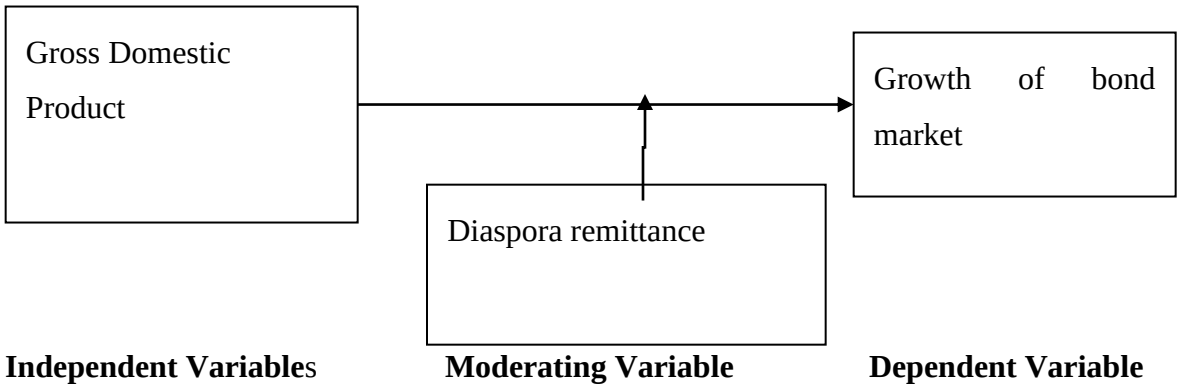

Figure 1: Conceptual Framework

2. RESEARCH METHODOLOGY

The study employed descriptive research design. The population of the study constituted the entire bond market in Kenya which comprises both corporate and government bonds all the bonds that had been issued and were being traded at Nairobi Securities Exchange within the period of the study. A census survey was conducted. A secondary data collection sheet was designed and used to collect the data from reports published by institutions such as the Central Bank of Kenya, the Nairobi Securities Exchange and the Kenya National Bureau of Statistics. The diagnostic checking for the model was done before model estimation. Monthly data was collected covering a period of 20 years between January 2000 and December 2019. The data collected was cleaned, edited, coded and stored before being analyzed. The data collected was analyzed through the e-views software. The regression that guided the study is as follows;

Model I (without diaspora remittance interaction)

$$Y_t = \beta_0 + \beta_1 X_{1t} + \beta_2 Z_{1t} + \varepsilon_t$$

Where: B_o= Constant term (intercept), Y_t = Bond Market Growth at time t, β – Parameters to be estimated while β_1 is the coefficient functions of the independent variables, X_{1t}= Gross Domestic Product at a time t, εt = Error term or Stochastic error at time t.

Model 2 (with diaspora remittance interaction)

$$Y_t = \beta_0 + \beta_1 X_{1t} + \beta_2 Z_{1t} + \beta_3 Z_{1t} * X_{1t} + \varepsilon_t$$

Where: B_o= Constant term (intercept), Y_t = Value of the Bond Market Growth at time t, β – Parameters to be estimated while β_1, is a coefficient functions of the independent variables, X_{1t}= Gross Domestic Product at a time t, Z_{1t}=diaspora remittances, ε_t = Error term or Stochastic error at time t.

3. FINDINGS

3.1 Correlation Analysis

Table 1 below presents the results on the correlation analysis of all the study variables. From the findings reported above the level of association between any two pairs of variables under study is reported. The findings showed that the bond market growth had a high correlation with GDP (r =0.527), p – value < 0.05). This implies that a positive change of GDP results to better growth rate of bond markets in Kenya. There also exists a positive correlation between diaspora remittance and bond market growth (r=0.625, p value < 0.05) which indicates that there is a strong positive correlation between study variables

Table 1: Correlation Matrix Test Results

Correlation analysis, Sample: 2000M01 2019M12, Included observations: 240

Probability	Growth of bond market	Gross Domestic Product	Diaspora remittance
Growth of bond market	0.100		

Gross Domestic Product	0.527	0.100	
P-value	0.000	-----	
Diaspora remittance	0.625	0.467	1.00
p-value	0.000	0.000	-----

3.2 Stationary Test.

Stationary test is also known as unit root test. It was carried out by the study to determine the prevalence of time series data used in the study. A stationary time series data is one that exhibits near constant mean, variance and autocorrelation. If the data is non-stationary it may lead to bias outcomes. The study employed ADF statistical test to establish whether the variables were stationary or not.

3.2.1 Bond Market Growth

Table 2 below presents the Augmented Dickey-Fuller test statistic for stationary test. The calculated t-statistic is more negative than the tabulated t-values. This implies that the variable is non stationary at level and differentiation is only viable option. The associated p-value is also greater than the cat-off value of 0.05. The p-values used to make decision are those developed by (MacKinnon, 1996) rather than the ones from the standards tables due to the presence of sleekness in the data.

Table 2: Unit Root Test for Bond Market Growth at Level

Null Hypothesis: growth of bond market has a unit root, Exogenous: Constant, (Automatic - based on SIC, maximum lags=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.153809	0.2240
Test critical values:	1% level	-3.457865	
	5% level	-2.873543	
	10% level	-2.573242	

*MacKinnon (1996) one-sided p-values.

Table 3 below presents the Augmented Dickey-Fuller test statistic for stationary test. The calculated t-statistic is now more negative than the tabulated t-values. This implies that the bond market growth variable is stationary after the first difference action. The associated p-value is also less than the cat-off value of 0.05. This value confirms that after including at most 12 lag the variable achieves stationary process when using the Augmented Dickey-Fuller test. This means that this variable is integrated of order one.

Table 3: Unit Root Test for Bond Market Growth at First Difference

Null Hypothesis: D(growth of bond market) has a unit root, Exogenous: Constant, (Automatic - based on SIC, maxlag =12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-15.01559	0.0000
Test critical values:	1% level	-3.457865	
	5% level	-2.873543	
	10% level	-2.573242	

*MacKinnon (1996) one-sided p-values.

3.2.2 Gross Domestic Product

Table 4 presents the Augmented Dickey-Fuller test statistic for stationary test of gross domestic variable at level. From the results above the calculated t-statistic is -0.684860 which is less negative than the tabulated t-values at 1%, 5% and 10% significance level. The associated p-value is 0.8471 which is more than the cut-off value of 0.05. However, the null hypothesis is accepted at 1%, 5% and 10% critical values. This means that the gross domestic product variable was non-stationary at level.

Table 4: Unit Root Test for of Gross Domestic Product at Level

Null Hypothesis: economic growth has a unit root, Exogenous: Constant, Lag Length: 2 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.684860	0.8471
Test critical values:	1% level	-3.457865	
	5% level	-2.873543	
	10% level	-2.573242	

*MacKinnon (1996) one-sided p-values.

Table 5 below presents the Augmented Dickey-Fuller test statistic for stationary test of gross domestic product variable at first difference. From the results above the calculated t-statistic value is -19.81246 which is more negative than the tabulated t-values at 1%, 5% and 10% significance level. The associated p-value is 0.0000 which is less than the cut-off value of 0.05. However, the null hypothesis is rejected at 1%, 5% and 10% critical values. This means that the gross domestic product variable was stationary at first difference.

Table 5: Unit Root Test of Gross Domestic Product at First Difference

Null Hypothesis: D (economic growth) has a unit root, Exogenous: Constant, Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-19.81246	0.0000
Test critical values:	1% level	-3.457747	
	5% level	-2.873492	
	10% level	-2.573215	

*MacKinnon (1996) one-sided p-values.

3.2.3 Diaspora Remittance

Table 6 below presents the Augmented Dickey-Fuller test statistic for stationary test. The calculated t-statistic is less negative than the tabulated t-values. This implies that the Diaspora Remittances variable is non-stationary at level which implies differencing may be a viable option. The associated p-value is also more than the cat-off value of 0.05. The p-values used to make decision are those developed by (MacKinnon, 1996) rather than the ones from the standards tables due to the presence of sleekness characteristics in the study variables.

Table 6: Diaspora Remittances at unit root test at level

Null Hypothesis: diaspora remittance has a unit root, Exogenous: Constant, Lag Length: 4 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.153908	0.9408
Test critical values:	1% level	-3.458104	
	5% level	-2.873648	
	10% level	-2.573298	

*MacKinnon (1996) one-sided p-values.

Table 7 below presents the Augmented Dickey-Fuller test statistic for stationary test. The calculated t-statistic is now more negative than the tabulated t-values. This implies that the Remittances variable is stationary after the first difference action. The associated p-value is also less than the cat-off value of 0.05. The p-values used to make decision are those developed by (MacKinnon, 1996) rather than the ones from the standards tables due to the presence of sleekness in the data. This value confirms that after including one lag the Remittances variable achieves stationary process when using the Augmented Dickey-Fuller test.

Table 7: Diaspora Remittances at unit root test at first difference

Null Hypothesis: D (diaspora remittance) has a unit root, Exogenous: Constant, Lag Length: 3 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-13.06458	0.0000
Test critical values:	1% level	-3.458104	
	5% level	-2.873648	
	10% level	-2.573298	

*MacKinnon (1996) one-sided p-values.

3.3 Normality Test

Normality test for residuals was conducted using the Jarque-Bera (JB) to determine whether the sample data has satisfied the normality assumption and whether the estimates are correct. The study sought to test the normality of the data by using Jarque Bera statistical method. Figure 2 below indicates that the probability value for Jargue-Bera was 0.0527767 that is greater than 0.05. The study failed to reject the null hypothesis and therefore it was concluded that the residual takes normal distribution curve.

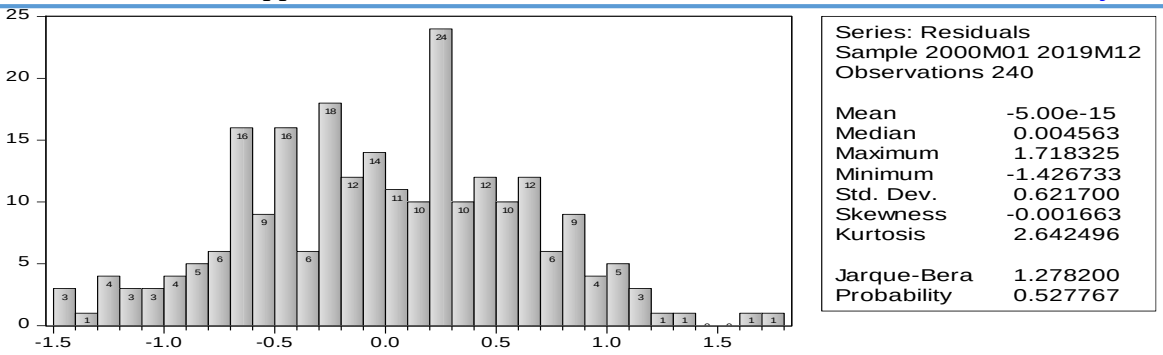

Figure 2: Residual Normality Test Results of GDP

3.4 Autocorrelation Test

Table 8 below presents the results on the autocorrelation test on the residuals. The first column presents the number of lags used. The second presents the respective autocorrelation coefficients. The third column presents the partial correlation which are all less than 0.05. The fourth column presents the Q statistic while the last column presents the Probability statistics which are insignificant.

The results show that there is no autocorrelation problem in the residuals which shows that the mode is well identified. In conclusion there is no evidence of autocorrelation among the residuals which show that that model is optimally identified.

Table 8: Autocorrelation Test Results of GDP

Lags	Autocorrelation	Partial Correlation	Q-Stat	Prob
1	0.032	0.032	0.2436	0.622
2	-0.010	-0.011	0.2668	0.875
3	-0.032	-0.031	0.5142	0.916
4	-0.036	-0.034	0.8246	0.935
5	-0.022	-0.020	0.9401	0.967

3.5 Heteroscedasticity Test

Table 9 below presents the results on the Heteroscedasticity test on the residuals. The results show that there is no heteroscedasticity problem in the residuals which shows that the mode is well identified. The test shows that the variance and the mean of all the estimates are constant

regardless of timeline and that the model can be used to predict or forecast the future movements. The probability statistics of both the F-statistic and the Chi-square probabilities of F (2,235)0.6056 and Prob. Chi-Square (2) 0.6038 are insignificant. This show that the model specified is optimal.

Table 9: Heteroskedasticity Test Results of GDP

Heteroskedasticity Test: ARCH			
F-statistic	0.267398	Prob. F (1,237)	0.6056
Obs*R-squared	0.269351	Prob. Chi-Square (1)	0.6038

3.6 Model Summary

Table 10 below presents the results on the fitness statistics. From the results it can be observed that R^2 in model 1 and 2 was .825and .839 respectively and the associated P values in both models were significant. This implies that 82.5% in model 1 and 83.9% in model 2 of bond market growth can be explained by gross domestic product. However, 17.5% in model 1 and 16.1% in model 2 of bond market growth cannot be explained by gross domestic product rate. The results also show that the R- square change and F-change are statistically significant between model one and two. This shows that there is a significant moderation influence of diaspora remittances on the relationship between gross domestic product and growth of bond markets in Kenya

From the results it can be observed that R-square and adjusted R-square are high. The results also show that the R- square change and F-change are statistically significant between model one and three. This show that there is a significant moderation effect of diaspora remittances on the influence of inflation rates on growth of bond markets in Kenya.

Table 10: Model Summary for moderation of gross domestic product

R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
.908	.825	.823	.6243	.000	.005	1	237	.943
.916	.839	.837	.6000	.014	20.544	1	236	.000

3.7 Analysis of Variance

From the ANOVA analysis results in table 11, gross domestic product significantly influences the bond market growth because the p value is equal to 0.000 and less that the significance level of 0.05 used in the study. The regression analysis results in the ANOVA table shows that the overall regression model significantly predicts the growth of bond market at 0.05 significance level. This implies that statistically, the applied model can predict the changes in the growth of bond market. This is further reinforcement that the addition of variables is relevant to the explanation of the bond market. For all the two models the results disclose that the variables employed are relevant in the explanation of the bond market growth.

Table 11: Analysis of variance for moderation of GDP

Model		Sum of Squares	df	Mean Square	F	p-value
1	Regression	434.853	2	217.427	557.84	.000
	Residual	92.374	237	.390		
	Total	527.228	239			
2	Regression	442.251	3	147.417	409.41	.000
	Residual	84.977	236	.360		
	Total	527.228	239			

3.8 Coefficients for Moderation

Table 12 below shows the regression results on coefficients of moderated gross domestic product. In the first model, the GDP was combined with diaspora remittance and the beta values was (β=-2.078, t=-10.847, P-value=0.00). This implied that GDP contributed an index of 2.078 to effectiveness of the growth in the bond market. The beta value of diaspora remittance was (β=.009, t=0.072, P-value=.943) and the study concluded that diaspora remittance was not a significant predictor in the model. In the second model, the interaction term (X_{1t}* Z_{1t}) was introduced with it the beta value for GDP increased significantly from (β=-2.078, t=-10.847, P-value=0.00) to (β=11.707, t=5.490, P-value=0.000) and therefore statistically significant. The beta values of diaspora remittance were (β=6.916, t=4.524, P-value=0.000) and as such the study reached a conclusion that diaspora remittance was a significant moderator in the model.

The model equations are;

Model 1: $Y_t = -7.494 + 2.078X_{1t} + .009Z_{1t} + \varepsilon_t$

Model 2: $Y_t = -154.566 + 11.707X_{1t} + 6.916Z_{1t} + -0.452Z_{1t} * X_{1t} + \varepsilon_t$

The study findings revealed that a diaspora remittance has a moderating effect on the relationship between GDP and bond market growth in Kenya. The beta coefficient of the combined variable and the interacting term has a significant improvement. The results show that there is a statistically significant effect of diaspora remittances as a moderator and that the variable has a positive significant effect. Thus, this section concludes that diaspora remittance variable is a relevant moderator for inflation rate. These results agree with the findings of Mohammad (2011), and Andere (2017).

Table 12: Coefficients for Moderation of GDP

Model		Coefficients		t-statistic	p-value
		B	Std. Error		
1	(Constant)	-7.494	.945	-7.933	.000
	Gross Domestic Product	2.078	.192	10.847	.000
	Diaspora remittances	.009	.129	.072	.943
2	(Constant)	-154.566	32.461	-4.762	.000
	Gross Domestic Product	11.707	2.132	5.490	.000
	Diaspora remittances	6.916	1.529	4.524	.000
	Diaspora remittances * Gross Domestic Product	-0.452	.100	-4.533	.000

4. CONCLUSION

From the research data analysis results and the resultant findings, it was concluded that gross domestic product significantly influences the growth of bond markets in Kenya. Based on the regression analysis the study concluded that GDP has a positive effect on bond market growth in

Kenya. Further the study concluded that gross domestic product influence was significantly moderated by diaspora remittance which enhanced its effect on bond market growth in Kenya.

The regression model showed that gross domestic product had an average positive relationship with bond market growth in Kenya. Thus, these findings supported those of Smaoui, Grandes and Akindele (2016) and Said (2013) with a conclusion that, there exists a positive influence of economic growth on bond market growth.

5. RECOMMENDATIONS

The study recommends that the government and the bond market policy makers should come up with policies and measures that help control and stabilize the GDP of a country since it has a significant influence in the bond market. This is important in order to avoid exploitation in the bond market sector to build confidence of the investors' hence increasing market segment investment activity. This would then have a substantial impact on the growth of bond market in Kenya. This would eventually improve economic growth of the country.

The study recommends that the government needs to devise measures that would boost investor confidence and thus attract increased Diaspora remittances. The government should institute aggressive campaigns targeting the Kenyans living in the diaspora to educate them on the importance of investing back at home.

The study focused on macroeconomic variables, its therefore recommended further studies to be done on the influence of micro economic factors on the growth of bond market. It is also recommended further studies to be carried out to include other emerging economies in the region such as the Eastern Africa countries. Additionally, further investigation should be done establish the causes and effects of bond market failure in Kenya.

6. REFERENCES

Adhikari, D. R., & Guru-Gharana, K. K. (2014). An econometric study of the effect of remittances on inflation in India. *Journal of International Business Research*, *13*(1), 105.

Ahwireng-Obeng, A. S., &Ahwireng-Obeng, F. (2019). Macroeconomic determinants of sovereign bond market development in African emerging economies. *International Journal of Emerging Markets*.

Andere, C. (2017). *Establishing the Causal Relationship between Inflation and Yield Curve Movements in Kenya for the Period Between 2010 to 2016* (Doctoral dissertation, United States International University-Africa).

Bekaert, G., Engstrom, E., & Grenadier, S. R. (2010). Stock and bond returns with moody investors. *Journal of Empirical Finance*, *17*(5), 867-894.

Bhattacharyay, B. N. (2013). Determinants of bond market development in Asia. *Journal of Asian Economics*, *24*, 124-137.

Blumberg, B., Cooper, D., & Schindler, P. (2014). *EBOOK: Business Research Methods*. McGraw Hill.

Brickman Bhutta, C. (2012). Not by the book: Facebook as a sampling frame. *Sociological methods & research*, *41*(1), 57-88.

Campbell, J. Y., Lo, A. W., &MacKinlay, A. C. (2012). *The econometrics of financial markets*. princeton University press.

Central Bank of Kenya, 2017). The Kenya Finacial sector stability report. *Published by the Financial Sector Regulators Forum, September 2018, Issue No. 9*

Galang and Kalui (2015). The relationship between earnings announcements and stock prices at the Nairobi securities exchange. *Journal of economics, commerce and management, 6*(1), 166-167

Gallagher, L. A., & Taylor, M. P. (2002). The Stock Return–Inflation Puzzle Revisited. Economics Letters, 75(2), 147-156.

Ganatra, S. (2016). *Factors Affecting the Performance of Infrastructure Bonds in Kenya: A Case of Kengen Infrastructure Bond* (Doctoral dissertation, United States International University-Africa).

Githinji, W. A. (2013) *Effect of selected macroeconomic variables on bond market development in Kenya*. Unpublished MBA Thesis, Nairobi: University of Nairobi.

Hondroyiannis, G., &Papapetrou, E. (20155). An examination of Wagner's law for Greece: A cointegration analysis. *Public Finance= Finances publiques*, *50*(1), 67-79.

Hussain, S., & Malik, S. (2011). Inflation and economic growth: Evidence from Pakistan. *International Journal of Economics and Finance*, *3*(5), 262-276.

Igbarago, M. E., &Eromosele, H. O. (2016). Econometric analysis of the effect of inflation on investment in Nigeria. *International Journal of Business & Economics Perspectives, 11*(1).

Ishak, N. M., Bakar, A., &Yazid, A. (2014). Developing Sampling Frame for Case Study: Challenges and Conditions.*World Journal of Education*, *4*(3), 29-35.

Kahn, B. (2005). Original sin and bond market development in Sub-Saharan Africa. *Africa in the world economy: The national, regional and international challenges*, 67-87.

Kamenju, C. I. (2018). *Effect Of Macroeconomic Factors on The Development of Bond Market In Kenya* (Doctoral dissertation, University of Nairobi).

Kariuki W. N. &Kagiri A. (2016). Effect of inflation on Aggregate Bond performance in Nairobi Securities Exchange in Kenya.*International Journal of management and commerce innovations, 4(2), 288-294.*

Kemboi, J. K. &Tarus, D. N (2012). Macroeconomic Determinants of Stock Market Development in Emerging Markets: Evidence from Kenya. *Research Journal of Finance and Accounting, 3(5).*

Kullapom, L., &Lalita, R. (2010). *Relationship between Inflation and Stock Prices in Thailand* (Doctoral dissertation, Master's Thesis, Umea University, Sweden).

Lee, C. M. (2001). Market efficiency and accounting research: a discussion of 'capital market research in accounting'by SP Kothari. *Journal of Accounting and Economics*, *31*(1-3), 233-253.

Longei, H. (2017). Determinants of bond market index at the Nairobi securities exchange in Kenya. *Strategic journal of business & change management*, *4*(4), 58-69.

Modigliani, F., & Cohn, R. A. (1979). Inflation, rational valuation and the market. *Financial Analysts Journal*, *35*(2), 24-44.

Mohammad, B.A. (2011) "Impact of Micro and Macroeconomic Variables on Emerging Stock Market Return: A Case on Dhaka Stock Exchange (DSE)", *Interdisciplinary Journal of Research in Business.*

Mukiza, C. N. (2011). Current Inflation Trends: Main Drivers. *Causes and Policy Implications,* Uganda Bureau of Statistics Staff Working Papers.

Newing, H. (2010). *Conducting research in conservation: social science methods and practice*. Routledge.

Ngaruiya, M., &Njuguna, A. (2016). Influence of Inflation on Bond Prices: A Survey of Bonds Listed At the Nairobi Securities. *American Journal of Economics*, *1*(2), 50-63.

Ngugi, R. W. And Agoti, J. (2014). Microstructure elements of bond markets in Kenya. *African conference paper,* 46 KIPPRA Discussion Paper No.027, Nairobi: Kenya Institute for Public Policy

Ngugi, S.M. & Afande, F.O. (2015). Drivers for Issuance of Corporate Bonds by Listed Companies in Kenya. *Developing Country Studies*, 5(7), 143-64.

Ritter, J. R. (2012). Is Economic Growth Good for Investors? 1. *Journal of Applied Corporate Finance*, *24*(3), 8-18.

Riungu, J. (2016). *A Survey of Factors Determining Development of Corporate bonds Market in Kenya* Unpublished MBA thesis, Nairobi: University of Nairobi.

Saunders, M., Lewis, P. H. I. L. I. P., &Thornhill, A. D. R. I. A. N. (2007). Research methods. *Business Students 4th edition Pearson Education Limited, England*.

Shiblee, L. S. (2009). The impact of inflation, GDP, unemployment, and money supply on stock prices.*GDP, Unemployment, and Money Supply on Stock Prices (December 29, 2009)*.

Siele, W. (2009). *Study on the relationship between bond market return and some selected macroeconomic variables in Kenya.* Unpublished MBA Thesis, Juja: JKUAT.

Tabachnick, B. G., Fidell, L. S., & Ullman, J. B. (2007). *Using multivariate statistics* (Vol. 5, pp. 481-498). Boston, MA: Pearson.

Tala, L. (2017). *Fiscal, Deficit, Inflation, Money Supply and Exchange Rate in South Africa* (Doctoral dissertation, Nelson Mandela University).

Wanyama, D. W. (2017). Effect of stock market volatility on the growth of corporate bond market in Kenya. *International Journal of Finance*, *2*(2), 76-91.

Wei, C. (2009). Does the Stock Market React to Unexpected Inflation Differently Across the business cycle? Applied Financial Economics, 19(24), 1947-1959.

Worlu, C. N., &Omodero, C. O. (2017). A comparative analysis of macroeconomic variables and stock market performances in Africa (2000-2015). *International Journal of Academic Research in Accounting, Finance and Management Sciences*, *7*(4), 95-102.