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Influence of Interest Rate on the Growth of Bond Markets in Kenya

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Abstract:
Bond markets refers to the market where trading of debt securities takes place and contributes to the economy by providing an efficient economic system. The study established the influence of interest rate on growth of bond market. Additionally, the study examined the moderating effect of diaspora remittance on the combined relationship. The secondary data obtained from the CBK, KNBS and NSE was used in the study for a period of 20 years. The study employed descriptive research design. Time series regression model was applied where data was presented in form of tables and graphs. The study findings revealed that the interest rate had a strong positive influence on the growth of bond market. After introducing a moderator, the effect improved with significant p value. The study found a positive significant relationship between interest rate and growth of bond markets in Kenya. It`s therefore recommended that the CMA as a policy maker should improve on the policies that stabilizes the variability of interest rate. 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 interest rate variability as it influences the growth of bond market.
Keywords: Interest Rate, Bond Market Growth, Diaspora Remittance
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1 Introduction

1.1 Background of the Study

Bond market growth is the main focus of greater economies that seek to raise capital for both investment and government expenditure. The bond market consists of both government and corporate bonds that shows a rapid growth rate, particularly in countries whose macroeconomic environments are stable and predictable (Ndunda, 2016). However, in countries characterized by volatile macroeconomic environment, they witness poor growth rate (Fabella & Madhur, 2013).

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. This ensures monetary policy direction, uniform interest rate across maturity range and the opportunity to hedge lending in bond market sector (Kahn, 2005). For a country to have effective growth rate in the bond markets, it requires favorable macroeconomic policies, existence of sound legal and regulatory framework, appropriate trading systems and significant participation of investors in the bond market (Ngugi & Agoti, 2014).

Greenwood, Hanson and Stein (2010) in their study discovered that, the growth of bond markets in its early stages requires great effort of transparency in trading of securities and instrument design to strengthen and develop the short end of the market. However, Brouwer, (2002) comments on the significance of understanding a banking system that is free from political interference and operates on market principles as an important source of demand for the bond market. Yoshitomi and Shirai, (2001) observed effectiveness of banks ride on market-oriented rules and regulations governing the macroeconomic environment and as a result they gain stability and yields better growth rate. For instance, Australia, Korea, China, and Taipei after financial deregulation in the 1980s today, banks in these countries are major buyers of corporate bonds. Hence, a robust banking sector operating along market principles reinforces rather than weaken the bond market.

Kenya has instituted various changes over the years in the bond market to enhance the rate of growth in bond markets. Some of these changes include establishing a segment for fixed income trading securities at the securities exchange and tax incentives. These benefits enable investors to reduce the costs of transactions, coupled with diversifying the maturities mainly for treasury bonds and modernizing the trading system mainly for the treasury bonds to improve its performance through advanced technologies (siele, 2009).

Over the years Kenya government has made efforts to boost growth of the bond markets in 2001 among the efforts is the initiation of reforms that restructure the domestic bond market to ensure sustainable funding source

of long term finances from both public and private sector (Ngugi & Agoti, 2014), Nonetheless, the bond markets in Kenya still experience poor growth rate compared to peer companies in Africa. A stable strong and progressive bond market need to exhibit stable macroeconomic variables, efficiency, transparency, volatility coupled with minimal transaction costs (Galang & Kalui, 2015).

(Nkwende, 2017) asserted that macroeconomic variables and banking sector development has negative and significant influence on the bond market capitalization and as such, they demonstrate strong evidence as robust macroeconomic influencers of bond market growth. Therefore, the study considered those factors as key promoter of growth in bond markets and strict monetary policies should be observed to control their effects on this sector.

Interest rate can be defined as the percentage cost of the principal charged for lending money to the borrower. Interest rates are usually charged per month or year (per annum) and its levels are determined by, and are directly proportional to the risk levels of the borrower. Thus, the amount borrowed should be invested in activities or use that generates more return than the lending rate so as to make economic sense (Doumpos & Gaganis, 2012).

The interest rate refers to income paid for money borrowed. This rate also measures the rate of return expected by the lenders of the money in the market. It should therefore reflect all the information regarding future changes in the purchasing power and the risk undertaken in the market (Laopodis, 2015). Rate of interest has significant influence on the values of financial assets for example stocks and bonds (Alam & Uddin, 2009). The interest rate and exchange rate in developing economies is likened to a coin of same side as low interest rate variability has persisted over the years. Consequently, the interest rate variability and exchange rate volatility perhaps may be responsible for the problem of poor growth rate in bond market (Ogilo, 2014). Mostly interest rate is unstable depending on the economy and affects the market value of the securities for instance; the bonds and the equities (Mainga, 2014).

Diaspora Remittances refers to transfer of money, goods and services by migrants back to their home country of origin or citizenship (Oucho, 2008). Remittances are a major source of external finances and can help to solve credit constraints or provide substitutes for the financial development of a country (World Bank, 2015). The effect of remittance inflows on the economic development of recipient countries centers on whether they are invested or consumed. If invested, remittances will generate a positive impact on growth and if consumed, it will either have an impact or not on growth of the economy (Burnside & Dollar, 2010). The growth of remittance inflows in developing countries has generated tough debate and controversy among academicians and policy makers studying the contribution of remittances on the growth of bond markets (Adams & Cuecuecha, 2010).

The growth of bond markets contributes to the economy by attracting foreign investors, providing an efficient economic system, greater investment opportunities, and deepening of the financial markets (Kahn, 2005). There is always an inadequacy of financial resources available for funding infrastructure projects on a long term basis in Kenya. This justifies that, there exist a financial gap and need arises to rely on other sources like bonds and concessions derived from private sector participation. Consequently, it is clear that the growth of bond markets is critical to stimulating economic growth particularly in developing economies like Kenya.

1.2 Statement of the Problem

Bond market growth has a positive influence in the development of a financial system and the economy of a country. This makes the growth of the bond market critical to financial system and economy of a country. Favourable macroeconomic policies, sound legal and regulatory framework and appropriate systems for trading leads to better growth of bond markets in a country (Ngugi & Agoti, 2014).

In developed countries like America where the largest and the most developed bond market are found, statistics indicates that the bond market is dominated by the developed countries (ADB, 2009). The European bond 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).

Most emerging bond markets, including Kenya are characterized by weak corporate mechanism, unstable macroeconomic environment, poor corporate governance, weak regulatory framework and unstable economic and political environment. This affects the confidence of local and foreign investors (Kemboi & Tarus, 2012). The companies registered in the bond market as at December 2019 stood at 24 in Kenya while in South Africa and Middle East countries like Malaysia stood at 32 and 48 companies respectively (Yahya, Rahi & Rashid, 2016). This depicts low participation of investors in the Kenyan bond market. As a matter of fact, this occurs as a result of unstable macroeconomic variables like interest variability and this may lead to poor growth in the bond market).

The government of Kenya took considerable efforts to enhance growth of the bond markets in 2001 In this year the Kenyan government commenced reforms to restructure domestic bond market to ensure sustainable funding source of long term finances from both public and private sector (Ngugi & Agoti, 2014). Despite all these, the bond markets in Kenya still experience poor growth rate regardless of the observed steady growth rate of bond markets in the African context.

It is worth observing that. 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 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 therefore sought to fill this gap conducting a study on influence of interest rate on growth of bond markets in Kenya.

1.3 Objectives

General Objective

The general objective that guided the study was to investigate the influence of macroeconomic variables on growth of bond market in Kenya.

Specific Objectives

i. Assess the influence of interest rate on the growth of bond markets in Kenya.
ii. Examine the moderating influence of diaspora remittances on the relationship between interest rate and the growth of bond markets in Kenya.

1.4 Literature Review

Gruber and Kamin (2012) conducted a study on the relationship between short term interest rates, inflation, and GDP growth rate and government bond yields. Their study found that macro-economic aspects had a significant positive relationship with government bond yields and in reality the, overall increase in market interest rates would make a new bond less appetizing because the already existing bond would be paying better interest returns.

Smales (2012) investigated how interest rate influences the performance of bonds in the Australian market. This study used secondary data and found that interest rate affects the performance of bonds. The researcher concludes that after a scheduled macroeconomic announcement, the sensitivity to order flow went up in the Australian interest rate future markets and this attributes to an increase in the level of information asymmetry.

Vissing-Jorgense (2011) evaluated the effect of the Federal Reserve's purchase of long-term Treasury and other long-term bonds between 2008 and 2011 on interest rates. The study used an event-study methodology. The study revealed that Treasury rates should not be used as a policy target since it is inappropriate to focus only on Treasury rates as a policy target because it works through several channels that affect particular assets differently. We find evidence for a signaling channel, a unique demand for long-term safe assets, and an inflation channel.

Wuhan and Khursid (2015) investigated on how investment was affected in the country of China. Their main objective was to test how interest rate affects investment of Jiangsu province in China. Their study used secondary data that was obtained in a period of 10 years from the year 2003 to 2012. Their study found that there was a negative relationship in the long run and a positive relationship in the short run. Their study further concluded that if the prices of bonds fall the interest rates moves upward.

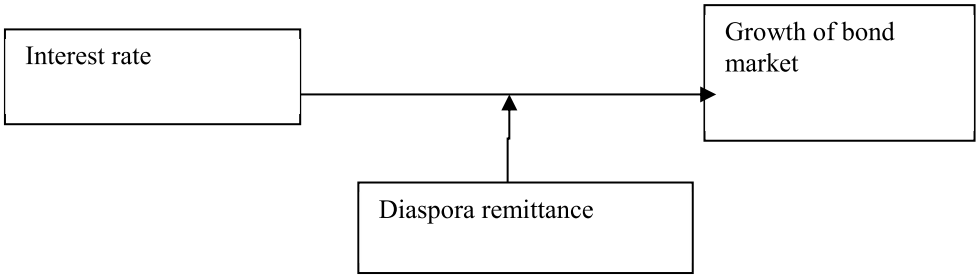
Poghosyan (2013) also noted that interest rate has an influence on government bond yields. Conversely, interest rate refers to the rate of return on investment and the bond investor would always seek to earn most. Interest charged is the main cost of debt financing and their fluctuations should be investigated with respect to government bond yields.

Radier (2016) examined on the determinants of bond yield spread changes in South Africa. The study used a sample population of 106 corporate vanilla bonds listed on the South African market for the period 2005-2013. The study reported that changes in equity volatility, interest rate level and the yield curve slope are significant determinants of bond yield spreads. Also the study found that the effects of equity volatility and interest rate level were more pronounced during the mid-financial crisis period. The study confirmed that Controlling for credit ratings and bond convexity does not modify the findings.

Ndunda (2015) investigated on the effects of interest rates on bond yield in the Kenyan bond market. The study targeted 15 corporate bonds that were issued in a period of seven years from the year 2008 to 2014. The study used secondary data and adopted the casual research design. The study adopted the liquidity premium theory of interest rate, market segmentation theory and preferred habitat theory. The study findings revealed that bond yield and interest rate risk has a positive relationship.

Ochieng (2015) conducted a study on the effects of interest rates on bond value at NSE. The researcher undertook a quasi-experimental research with time series data of nominal value of treasury gilt-edged bonds being regressed against the three regressors or interest rates using regression statistics. The study focused on interest rates, central bank rate, interbank rate and REPO rate where secondary data was used from 2008 to 2014. The findings of the study revealed that CBR has a negative relationship with the nominal value of treasury gilt-edged bonds however IBR has a positive relationship with Repo rate.

1.5 Conceptual Framework



Independent Variables **Moderating Variable** **Dependent Variable**
Figure 1: Conceptual Framework

2. Research Methodology

The study employed a descriptive research design. The population of the study constituted the entire bond market that comprises of both corporate and government bonds issued and being traded at Nairobi Securities Exchange within the period of study. Monthly data was collected covering a period of 20 years between January 2000 and December 2019. Secondary data collection instrument was designed and used to collect the data from published reports by the CBK, NSE and KNBS where census survey was conducted. The data collected was cleaned, edited, coded and analyzed through the e-views & stata software's. The regression models that guided the study include the following;

Model I (without diaspora remittance interaction)

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

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 = Bond Market Growth at time t,

β – Parameters to be estimated

X_{1t}= Interest Rate at a time t,

εt = Error term or Stochastic error at time t.

Z_{1t}=diaspora remittances, ε_t =

3. Findings & Discussions

3.1 Correlation Analysis

Correlation analysis was conducted to determine the strength of the relationship between the study variables. From the findings reported in table 1 revealed that the bond market growth had a positive correlation with diaspora remittance (r =0.633, p – value < 0.000). This implies that a positive change of diaspora remittance results to better growth rate of bond markets in Kenya. However, the correlation between interest rate and the growth of bond market was negative with a correlation coefficient of 0.080 and the p value of 0.062.

Table 1: Correlation Matrix Test Results

Probability	Growth of bond market	Interest rate	Diaspora remittance
Growth of bond market	0.100		

Interest rate	-0.080	0.100	
P-value	0.062	-----	
Diaspora remittance	0.633	0.567	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. If time series data is stationary, it displays constant mean and variance. 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 showed the ADF test results of stationary test for bond market growth variable at level. From the results, the calculated t-statistic is -2.155809 which is less negative than the tabulated t-values at 1%, 5% and 10% significance level. The associated p-value was 0.2340 which is more than the cut-off value of 0.05. However, the study accepted the null hypothesis therefore the bond market variable was non-stationary at level.

Table 2: Stationary Test Results of Bond Market Growth at Level

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.155809	0.2340
Test critical values:	1% level	-3.457865	
	5% level	-2.873543	
	10% level	-2.573242	

Stationary Test of Bond Market Growth at First Difference.

Table 3 presents the ADF test results of stationary test for bond market growth variable at first difference. From the results, the calculated t-statistic value was -15.02559 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 was rejected and the bond market variable was stationary at first difference.

Table 3: Bond Market Growth Stationary Test Results at First Difference

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-15.02559	0.0000
Test critical values:	1% level	-3.457865	
	5% level	-2.873543	
	10% level	-2.573242	

3.2.2 Interest Rate

Table 4 presents the Augmented Dickey-Fuller test results for stationary test of interest rate variable at level. From the results the calculated t-statistic is -2.740146 that was less negative than the tabulated t-values at 1%, 5% and 10% significance level. The associated p-value is 0.0704 which is more than the cut-off value of 0.05. However, the null hypothesis is accepted and the interest rate variable was non-stationary at level

Table 4: Interest Rate Stationary Test Results at Level

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.740146	0.0704
Test critical values:	1% level	-3.457747	
	5% level	-2.873492	
	10% level	-2.573215	

Stationary Test of Interest Rate at First Difference.

Table 5 presents the Augmented Dickey-Fuller test statistic for stationary test of interest rate variable at first difference. From the results above the calculated t-statistic values was -12.85711 which is more negative than the tabulated t-values at 1%, 5% and 10% significance level. The associated p-value is 0.0000 and less than the cut-off value of 0.05. However, the null hypothesis is rejected and the interest rate variable was stationary at first difference.

Table 5: Interest Rate Stationary Test Results at First Difference

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-12.85711	0.0000
Test critical values:	1% level	-3.457747	
	5% level	-2.873492	
	10% level	-2.573215	

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

3.3.3 Diaspora Remittances

Table 6 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 was more than the cat-off value of 0.05. However, the null hypothesis is accepted and the diaspora remittance variable was not stationary at level.

Table 6: Diaspora Remittances Unit Root Test Results at level

		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	

Stationary Test of Diaspora Remittance at First Difference.

Table 7 presents the output results for stationary test. The calculated t-statistic was more negative than the tabulated t-values. This implies that the diaspora remittances variable was stationary after the first difference action. The associated p-value was also less than the cat-off value of 0.05. However, the null hypothesis is rejected and the interest rate variable was stationary at first difference.

Table 7: Diaspora Remittances Stationary Test Results at Level

		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	

3.3 Normality Test

Normality test for residuals was conducted using the Jarque-Bera (JB) statistical method to determine whether the sample data has satisfied the normality assumption and whether the estimates are correct. Figure 2 indicates that the probability value for Jargue-Bera was 0.248135 that was greater than 0.05. The study failed to reject the null hypothesis and therefore it was concluded that the residual takes normal distribution curve.

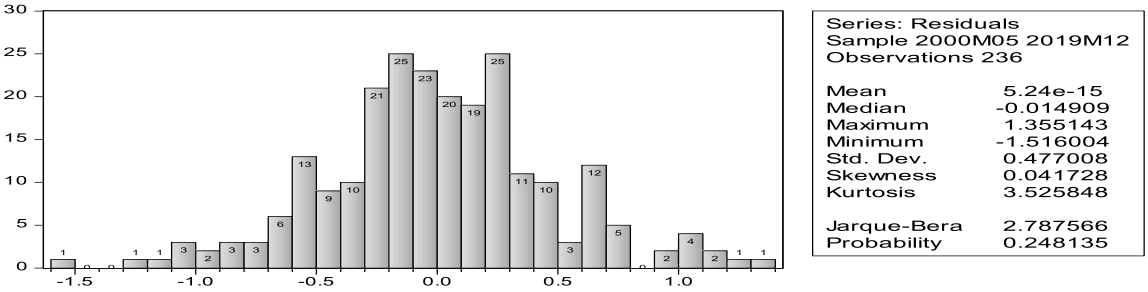


Figure 2: Residual Normality Test Interest Rate

3.4 Autocorrelation Test

From the results in table 8, it`s revealed that there is no problem of autocorrelation in the residuals since the p values are insignificance. This is also an indication that the model is well and optimally identified.

Table 8: Autocorrelation Test Results of Interest Rate

Lags	Autocorrelation	Partial Correlation	Q-Stat	Probability
1	0.093	0.093	2.1231	0.145
2	-0.054	-0.063	2.8287	0.243
3	-0.035	-0.024	3.1299	0.372
4	-0.077	-0.075	4.5702	0.334
5	0.012	0.023	4.6043	0.466

3.5 Heteroscedasticity test

Heteroscedasticity test was conducted to establish whether the variability of the variables was not equal across a range of the predictor variables using Breusch-Pagan statistical method. Null hypothesis states that, there is constant variance across range of the predictor if the p value is less than 0.05. From

Table 9, revealed that the overall p value attained was greater than 0.05. This necessitates a constant variance and as a result the study fails to reject the null hypothesis. It's therefore concluded that heteroscedasticity does not exist which shows that the model is well identified.

Table 9: Heteroscedasticity test

Heteroskedasticity Test: ARCH			
F-statistic	1.652514	Prob. F(2,235)	0.1938
Obs*R-squared	3.300797	Prob. Chi-Square(2)	0.1920

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 .742 and .763 respectively and the associated P values in both models were significant. This implies that 74.2% in model 1 and 76.3% in model 2 of bond market growth can be explained by interest rate. However, 25.8% in model 1 and 23.7% in model 2 of bond market growth cannot be explained by interest 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 interest rate and growth of bond markets in Kenya.

Table 10: Model Summary Test Results for Interest Rate

R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
.862	.742	.740	.7569564	.701	645.261	1	237	.000
.873	.763	.760	.7279316	.020	20.277	1	236	.000

3.7 Analysis of Variance

Table 11 showed the ANOVA test results and it revealed that interest rate significantly influences the bond market growth since the p value is less than 0.05. The regression analysis result confirms that the overall regression model significantly predicts the growth of bond market. This implies that statistically the applied model can predict the changes in the growth of 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 Test Results for Interest Rate

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	391.431	2	195.715	341.573	0.000
	Residual	135.797	237	0.573		
	Total	527.228	239			
2	Regression	402.175	3	134.058	252.995	0.000
	Residual	125.053	236	0.530		
	Total	527.228	239			

3.8 Overall Regression Model

Table 12 presents the regression results on coefficients of moderated interest rate. In the first model, the interest rate was combined with diaspora remittance and the beta values was (β=0.614, t=2.061, P-value=0.040). This implied that interest rate contributed an index of 0.614 to effectiveness of the growth in the bond market. The beta value of diaspora remittance was (β=1.366, t=25.402, P-value=.000) and the study concluded that diaspora remittance was 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 interest rate increased significantly from (β=0.614, t=2.061, P-value=0.040) to (β=24.800, t=4.388, P-value=0.000) and therefore statistically significant. The beta values of diaspora remittance were (β=1.801, t=2.554, P-value=0.011) and as such the study reached a conclusion that diaspora remittance was a significant moderator in the model. Thus this section concludes that diaspora remittance variable was a relevant moderator for interest rate. These findings agreed with the findings of Wuhan and Khursid (2015) and Ndunda (2015).

The model equations are;

Model 1: $Y_t = 9.128 + 0.614X_{1t} + 1.366Z_{1t} + \varepsilon_t$

Model 2: $Y_t = 60.443 + 24.800X_{1t} + 1.801Z_{1t} + 1.158Z_{1t} * X_{1t} + \varepsilon_t$

Table 12: Coefficients for Moderated Interest Rate

Model		Coefficients		t-statistics	p-value
		B	Std. Error		
1	(Constant)	9.128	1.648	5.538	.000
	Interest rate	0.614	0.298	2.061	.040
	Diaspora remittances	1.366	0.054	25.402	.000
2	(Constant)	60.443	15.531	3.892	.000
	Interest Rate	24.800	5.651	4.388	.000
	Diaspora remittances	1.801	0.705	2.554	.011
	Diaspora remittances *interest rate	1.158	0.257	4.503	.000

4. Conclusion

From data analysis results and the resultant findings, the study concluded that interest rate significantly influences the growth of bond markets in Kenya. Based on the regression analysis the study concluded that interest rate positively and significantly influences the bond market growth in Kenya. Consequently, the high interest rate leads to a better growth rate in the bond market. Further the study concluded that diaspora remittance was a significant moderator Thus these findings corroborated with those of Ochieng (2015 and Njoroge (2013).

5. Recommendations

The study recommended that the government of Kenya through the CBK should formulate favourable policies and measures that helps in controlling and stabilizing the variability of interest rate as this forms an important aspect since it creates confidence in investors and avoids exploitation in the bond market sector. Since the study found that diaspora remittance has a positive significance moderating influence, it's therefore recommended that the government of Kenya should institute aggressive campaigns targeting people living in diaspora to educate them on the importance of investing back at home. Finally, the national assembly therefore needs to provide a conducive environment for diaspora investors through formulation of favorable investment policies.

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