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MACROECONOMIC VARIABLES AND PERFORMANCE OF CORPORATE BONDS ISSUED BY LISTED COMPANIES AT THE NAIROBI SECURITIES EXCHANGE: AUTO-REGRESSIVE DISTRIBUTED LAG (ARDL) MODEL

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Abstract

This study examines the impact of selected macroeconomic variables on corporate bond market performance in Kenya. Using the Auto-Regressive Distributed Lag (ARDL) approach, the study analyzes quarterly corporate bond market capitalization data from 2015 to 2022 to determine the short-run and long-run effects of exchange rates, government expenditure, interest rates, and inflation rates on corporate bond performance. The results indicate a significant long-run negative relationship between corporate bond performance and exchange rates, government expenditure, and interest rates. Inflation rates have a positive impact on corporate bond performance in the long run, while the short-run impact of exchange rates, government expenditure, and interest rates is not significant. The study recommends that companies stay informed about the macroeconomic situation and that policymakers implement strict monetary policies to enhance corporate bond performance. Further research can be conducted to examine the impact of additional economic variables and sectors using the ARDL approach.

Keywords: Corporate Bond Performance, Macroeconomic Variables, ARDL Modeling, Error Correction Model, Monetary Policies, Securities Exchange Market

INTRODUCTION

Bonds are financial instruments that provide a fixed income to investors, with regular payments of principal and interest according to a predetermined schedule (Hwang, 2016). Corporate bond financing has become an important source of long-term financing for firms, especially as bank lending has been diminishing. According to Tendulka and Hancock, (2014), Corporate bond markets can be considered an important contributor to economic growth, financial stability, and economic recovery. They provide a crucial capital funding flow to firms, allowing them to expand, innovate, offer employment, and provide the goods and services societies demand. Since the industrial era, the bond market has been one of the main drivers of economic growth and development in the global financial markets (Kwamuma & Weda, 2019). However, in Kenya, corporate bonds represent a paltry 0.15% of total bond turnover while treasury bonds compose of the remaining huge 99.85% (CMA, 2020).

Due to volatility witnessed from the year 2015 in the corporate bonds market, some private companies have been hesitant to issue corporate bonds despite a stable yield curve instead opting to raise finance through equity issuance. This has resulted in inefficiency in allocation of financial resources (Maina & Kimutai, 2018). The lack of efficiency in the Kenyan corporate bond market is apparent in the decreasing trade volume of corporate bonds. The only new issuance since 2015 was by the British real estate firm Acorn Holdings and private equity fund Helios, with the first Green Bond in October 2019. Furthermore, the total value of outstanding bonds in the secondary market decreased from KSh 86.8 billion for 17 issues in 2016 to KSh 23.2 billion for 6 issues as of June 2020, as reported by the Central Bank of Kenya (CBK) in 2020.

Macroeconomic variables are essential tools for analyzing and understanding the overall health and stability of an economy. These variables are closely monitored by policymakers, investors, and businesses, as they provide insights into the current and future state of the economy. A stable and predictable macroeconomic environment is crucial for the efficient functioning of financial markets (Aduda, et al., 2012). Macroeconomic variables such as interest rates, inflation rates, exchange rates, and government expenditure can have a significant impact on the performance of the corporate bond market (Maina & Kimutai, 2018). As such, understanding the relationship between these variables and the corporate bond market is crucial in developing effective policies to promote its growth and stability.

A review of current research indicates that nations with macroeconomic stability and low investment risk, characterized by consistent prices, high economic growth, less volatile exchange rates, and increased GDP, are appealing to foreign investors (Ukachukwu & Odionye, 2020). According to Mugo (2018), There is market orientation in banks with clear rules

and a stable macroeconomic environment. This has facilitated the rapid growth of the bonds market in China, Australia, Taipei and Hong Kong. In these countries, the purchase of corporate bonds has been high. However, looking at the economic situation in Kenya, it is apparent that there is a significant level of macroeconomic imbalance due to various disruptions in these macroeconomic variables. For instance, the issue of increased government expenditure has resulted in fiscal pressure, leading to a decline in forex reserves and a slowdown in the country's stock market. This study therefore sought to determine the impact of selected macroeconomic variables on the performance of corporate bonds of listed companies at the Nairobi securities exchange.

Although, there are many research studies on the nexus between macroeconomic variables and stock market performance in Kenya, only few of the studies examine the impact selected macroeconomic variable on corporate bond performance (see Waweru, (2014), Ndegwa, (2016), Mega and Widayat, (2019) and Özlen, (2012). This study differs from the existing studies by looking at the effect of selected macroeconomic variables on corporate bond performance of companies listed at the Nairobi securities exchange by employing Auto Regressive Distributed Lag (ARDL) model. The remaining part of this work is divided into four. Section two reviews related literature, section three discusses the methodological issues and section four presents and discusses the empirical results while section five highlights policy implications and conclusion.

EMPIRICAL LITERATURE

Ndunda (2018), study focused on the effect of interest rate risk on bond yields in the Kenyan bond market. data was collected from secondary sources, as well as financial statements of the companies under study. The sample used was 15 corporate bonds issued between 2008 to 2014, and descriptive statistics and inferential analysis were used for data analysis. The findings showed a positive relationship between interest rate risk and bond yields, with interest rate risk determined by the bond's maturity and interest rates. Longer maturity bonds had higher interest rate risk, while short-term maturity bonds had lower interest rate risk. The study concluded that the more leveraged a firm is, the higher the yield of the bond will be. Furthermore, when supply amount increases, it triggers lower yields on the bonds, and as profitability levels increase, it brings about a lower yield.

Chege (2018), conducted a study to investigate the impact of macroeconomic factors on the development of the bond market in Kenya. The study used a census sampling method to collect data on 81 government and corporate bonds and adopted a causal research design. Diagnostic tests were performed, including a test for multicollinearity. The results indicated that

an increase in interest rates was significantly associated with a growth in the bond market size. Furthermore, interest rates were found to have a more significant and positive effect on both corporate and government bonds than other macroeconomic variables.

Ahwireng-Obeng (2016), investigated the performance determinants of local currency bond markets in Africa. The study used an econometric model and regression analysis to estimate various factors that influence the performance of local currency bonds in Africa, with a population of 49 listed companies from bond issuing and non-issuing firms in 26 African countries. The findings of the study showed that central government debt and fiscal balance had an effect on local bond markets in African economies. The study argued that countries with large public debt tend to have less developed local currency bond markets, which could portray poor debt management practices. Moreover, the study found that bond market capitalization in African economies was not significant enough to enjoy the benefits of fiscal financing.

Bretscher, Hsu and Tamoni, (2020) , examined the effect of fiscal policy on bond risk premia using stochastic volatility to estimate fiscal policy rules for government spending and capital tax rates. The study covered the period between 1970Q1 to 2016Q4. The findings revealed that fiscal policy is a crucial driver of the term structure of interest rates and bond risk premia. The study argued that higher government spending levels and uncertainty predict higher future bond excess returns. Moreover, a higher level of government spending leads to a positive shift and steepening of the yield curve, while higher uncertainty results in a steepening of the yield curve. Additionally, shocks to spending levels and uncertainty were shown to be priced in the cross-section of stock and bond returns.

Ogilo (2014), conducted a study to investigate the impact of selected macroeconomic variables on bond market development in Kenya. Secondary data was collected from annual reports of the central bank of Kenya, capital markets authority (CMA), Nairobi stock exchange (NSE), and Kenya national bureau of statistics (KNBS). The study analyzed 20 corporate bonds, 56 treasury bonds, and 5 infrastructure bonds listed at the NSE using descriptive and regression analysis. The results showed that exchange rates had the most significant impact on the bond markets. Specifically, the study argued that a stronger Kenyan shilling against the US dollar would lead to a more vibrant bond market.

Otieno (2018), looked at the volatility effects of foreign exchange on the financial performance of the bond market in Kenya. Data on foreign exchange volatility was collected from the Central Bank of Kenya (CBK) website and statistical abstracts for the period under study. The population used in the study consisted of 50 issued bonds at the NSE. Findings of the study revealed that a unit of currency exchange volatility resulted in a 22.4% negative change in the financial performance of the bond market.

Vartholomatou, Pendarak and Tsagkanos, (2020), investigated the quantile dependence between the returns of corporate bond investors and exchange rates in two peripheral eurozone countries, namely Ireland and Greece. The researchers collected data from various secondary sources, including the Thomson Reuters website. They utilized a unique econometric methodology called the cross-quantilogram. The study's results showed that there was insufficient evidence to demonstrate a relationship between corporate bond returns and exchange rates.

Shruthi and Suresha (2015), conducted an empirical study on the impact of changes in macroeconomic variables on the Indian corporate bond yield curve. The study collected a dataset of three years from 2012 to 2014 and used the Vector Error Correction model (VECM) for data analysis. The study found that inflation rate shock affects the inflation rate positively, while interest rate shock affects the interest rate negatively. An increase in inflation rate tends to decrease one of the components of a yield curve, such as level, which causes investors to shy away from investing in corporate bonds.

Jerop (2018), analyzed macroeconomic factors and corporate capital structure by taking evidence from non-financial firms listed at the NSE. Data was collected from annual reports of the NSE, respective annual company reports and the central bank website. The study employed a panel regression approach. The study was based on the period 2007 to 2017. Findings from her study revealed that inflation had a positive significant effect on capital structure of NSE non-listed firms. Additionally, a one percent increase in inflation was shown to increase the corporate bond debt ratio of companies by 0.513%.

Park (2017), investigated the advances made in developing local currency bond markets in emerging Asia, focusing on regional initiatives taken since the 1997-1998 Asian crisis. The study argued that better macroeconomic performance coupled with stronger institutions promotes the development of corporate bond markets in terms of size. The study found that low inflation may be linked with effective monetary policy that encourages corporate bond issues.

Mugo (2018), examined the effect of macroeconomic factors on the performance of corporate bonds in Kenya. The study used a longitudinal research design, and secondary data from 2007 to 2017 was collected from time-series annual reports of the Central Bank, Capital Markets Authority (CMA), Nairobi Stock Exchange (NSE), and Kenya National Bureau of Statistics (KNBS). The study used descriptive and inferential statistics, and data analysis was done using STATAv13. The study found that inflation is a key contributing factor to bond performance in Kenya, with an increase in inflation leading to a significant increase in bond performance. This suggests that controlling the rate of inflation in the country could significantly reduce volatility in the securities market.

Bhattacharyay (2013), empirically examined the determinants of bond market development in 10 major East Asian economies. Data on exchange rate indices was collected from the Asian Regional Integration Center and the ADB. The study covered the period 1998-2008 and adopted the simple GLS regression. The findings of the study showed that exchange rate variability had a significant negative relationship with government bonds under the GLE method with corrections for heteroskedasticity. However, it had no significant and consistent relationship with the growth of corporate bonds. This is due to the fact that the growth of the corporate bond market is lagging behind the rest of the bond markets.

Le, Nguyen and Nguyen, (2016), examined how macro-determinants influenced corporate bonds by companies in 90 developed and less-developed countries between 1970 and 2013. Annual data on corporate bonds was collected from http://em.cbonds.com, and data on the exchange rate was collected from the website www.fxtop.com. The study employed the Generalized Method of Moments (GMM) model. The study's findings showed that exchange rate variability had a positive impact on corporate bonds. Specifically, the more fluctuations in exchange rate, the more the corporate bond market develops. The study argued that variability in exchange rates influenced firm corporate bond decisions.

Huang, Chang and Tian (2018), investigated the macroeconomic factors affecting corporate bond yield spreads using time-series methods. The study used approximately 50 corporate bonds with weekly transaction data from December 2011 to December 2012 as the sample. Secondary data was collected from the wind database. The study employed the VIF method to test the multicollinearity of the series. The study found that the exchange rate was significant in the model. Specifically, when the Chinese currency (RMB) appreciates against the US dollar, exports increase, and corporation risk declines, causing corporate bond yield spreads to decrease. Conversely, when the RMB depreciates against the US dollar, corporations reduce exports, corporate risk rises, causing corporate bond yields to increase.

METHODOLOGY

The study used quarterly time series data for an eight-year period (2015 - 2022) because of the availability of data from Central Bank of Kenya (CBK), Capital Markets Authority (CMA), Nairobi securities exchange (NSE), The national treasury of Kenya and Kenya National Bureau of Statistics (KNBS). In order to explain the effects of the macro-economic variables on performance of corporate bonds, the study employed multiple time series estimation based on Autoregressive Distributed Lag (ARDL) co-integrated technique.

The regression model of the form below was applied,

$$Yt = \beta o + \beta Xt + \varepsilon t \text{..... eq 1}$$

Where: Yt is the dependent variable in quarter 't', β0 is the constant term, β is the coefficient of the independent variables, X it is the independent in quarter 't' and εt the normal error term. Coefficients of the explanatory variable were estimated by the use of an Error Correction Model (ECM) to analyze the dynamic short term-relationships due to existence of co-integration.

The regression model that was applied is provided below:

$$Yt=\beta_o+\beta_1 x_{it}+\beta_2 x_{2t}+\beta_3 x_{3t}+\beta_4 x_{4t}+\varepsilon t \text{ .....Eq 2}$$

Where: Yt = Quarterly Corporate bond performance turnover in period t

β_0= Intercept

β 1, β 2, β 3 and β 4 are the coefficients of independent variables

x_{it}= Interest rate measured as quarterly interest in period t

x_{2t}= Government expenditure measured as quarterly development expenditure in period t

x_{3t}= Exchange rate measured as quarterly exchange rate in period t

x_{4t}=Inflation rate measured as quarterly inflation rate in period t

ε - error term

Taking the natural logarithm of equation above and considering the case of four explanatory variables, the model was converted into the following linear form:

$$\text{Ln CORPBt} = \beta 0 + \beta 1\text{Ln (GVEXt)} + \beta 2\text{Ln (ECHt)} + \beta 3\text{Ln (INFt)} + \beta 4\text{Ln (INTt)} + \mu t \text{.....eq 3}$$

Where: CORPB = Corporate bond capitalization

GVEX = Government expenditure

ECH = Exchange rate

INF = Inflation

INT = Interest rate

The ARDL model was developed by Pesaran, (2015). It involves modeling the relationship between a dependent variable and a set of independent variables, including lagged values of the dependent variable and other explanatory variables. ARDL main advantage is its flexibility in modeling both stationary and non-stationary time series data. Based on our model the ARDL Bound testing will be:

$$\Delta\text{LnCORPBt} = \beta 0 + \Sigma_{i=0}^{q}\beta 1\text{iLnCORPB}(t-1) + \Sigma_{i=0}^{q}\beta 2\text{iLnGVEX}(t-1) + \Sigma_{i=0}^{q}\beta 3\text{iLnECH}(t-1) + \Sigma_{i=0}^{q}\beta 4\text{i LnINF}(t-1) + \Sigma_{i=0}^{q}\beta 5\text{i LnINT}(t-1) + \Sigma_{i=0}^{q}\beta 6\text{iLnCORPB}(t-1) + \Sigma_{i=0}^{q}\beta 7\text{iLnGVEX}(t-1) + \Sigma_{i=0}^{q}\beta 8\text{iLnECH}(t-1) + \Sigma_{i=0}^{q}\beta 9\text{i LnINF}(t-1) + \Sigma_{i=0}^{q}\beta 10\text{i LnINT}(t-1) + \mu t \text{ ..... eq4}$$

Where: Δ is the first difference operator, q is the optimum lag length, β1--- β5 are short run dynamics of the model and β6--- β10 represent the long run multipliers consistent with long run relationship (Ukachukwu & Odionye, 2020).while μt is the error term.

We conducted bound test based on equation 4. As per the result of the bound test, if the value of calculate F statistics, is greater than the upper bound I (1), the null hypothesis should be rejected (Kunwar, 2019). If the calculated value of F statistics is greater than the upper bound, there exists co-integration and the study further proceeds for error correction version of the above equation. If F statistics is less than the lower bound or inconclusive value comes between the lower bound I (0) and upper bound I (1) in this case the study run ARD short run which is based on OLS method.

$$\Delta \mathrm{LnCORPBt} = \beta 0 + \Sigma_{i=0}^{q} \beta 1 i \mathrm{LnCORPB}(t-1) + \Sigma_{i=0}^{q} \beta 2 i \mathrm{LnGVEX}(t-1) + \Sigma_{i=0}^{q} \beta 3 i \mathrm{LnECH}(t-1) + \Sigma_{i=0}^{q} \beta 4 i \, \mathrm{LnINF}(t-1) + \Sigma_{i=0}^{q} \beta 5 i \, \mathrm{LnINT}(t-1) + \lambda \mathrm{ECT}(t-1) + \mu t \quad \text{..... eq 5}$$

Where: q1 --- q5 are optimal lag length and λ is the speed of adjustment parameter. ECT represents the error correction term derived from long run relationship from equation 4. The data used for this study are quarterly secondary data and were sourced from various relevant institutions in Kenya covering the period 2015 – 2022.

FINDINGS

Unit Root Test

The study used Augmented Dickey Fuller (ADF) Test to examine stationarity of the time series data for the variables corporate bond performance, exchange rate, government expenditure, inflation and interest rates.

Table 1: ADF unit root test results

variables	ADF TEST STATISTICS		
	level	First difference	Decision
LNCORPB	-4.034628	-6.903817	I(0), I(0)
LNECH	-2.82277	-5.934112	I(1)
LNGVEX	-3.777654	-3.934112	I(0), I(10
LNINF	-3.176348	-4.821566	I(1)
LNINT	-0.487841	-4.193207	I(0)

After observing Table 1, it can be seen that the variables being studied, namely Corporate Bond Performance and Government Expenditure, are stationary at the level as per the ADF test. However, the other variables are not stationary. When we convert all the data to

first differences, all the variables become stationary. This means that the data is of mixed order of integration, with some variables being integrated of order 0 (I (0)) and some being integrated of order 1 (I (1)). Since the data is of mixed order of integration, the study cannot proceed with the Johansen Co-integration test (Kunwar, 2019). Therefore, the Auto-regressive Distributive Lag (ARDL) model is used for further analysis**.**

Lag Length Selection

Table 2 displays the results of the analysis for selecting the appropriate lag length. The selection criteria for each column are indicated by an asterisk (*), which represents the minimum lag length that was chosen.

Table 2: Lag Length Selection Results

Lag	LogL	LR	FPE	AIC	SC	HQ
0	111.4655	NA	1.38e-10	-8.517244	-8.273468	-8.449631
1	173.3998	94.14008	7.52e-12	-11.47198	-10.00933	-11.06631
2	185.2899	13.31692	2.82e-11	-10.42319	-7.741666	-9.679452
3	278.6211	67.19843*	2.82e-13*	-15.88969*	-11.98928*	-14.80788*

According to Gujarati and Porter, (2009), a lag refers to the time delay in the response of a dependent variable to changes in an explanatory variable. In economic modeling using time series data, selecting an appropriate lag length is crucial and sensitive. Therefore, using a suitable criterion for lag selection is important. The study used the Akaike Information Criterion (AIC) and Schwarz Information Criterion (SC) to identify the optimal lag length for a standard ARDL model with one, two, and three lags. The results indicated that the optimal lag length for this model is three. The selection of the option ARDL (3, 0, 1, 2, 3) was based on the Akaike information criteria.

ARDL Bound Cointegration Test

Co-integration testing is a statistical method used to determine whether variables are integrated and move together in the long run towards an equilibrium relationship (Kunwar, 2019). The study used the Bound Cointegration testing technique to test for the existence of co-integration. The data used in the study were of mixed order and became stationary after first differencing. As a result, the study applied the ARDL bound testing model to test for co-integration. The ARDL bound cointegration test assumes a null hypothesis that the variables are not cointegrated, while the alternative hypothesis suggests that they are. To conclude, the F-

statistic is compared to the upper bound critical values at a chosen level of significance, and if the F-statistic exceeds this value, the null hypothesis is rejected (Pesaran, 2015). Table 2 below displays the outcome of the ARDL cointegration test.

Table 3: ARDL Bound Cointegration Test Result

Model	F-Statistics	K	Significance level	Critical Bound Value	
				10 (Lower Bound)	11 (Upper Bound)
1	8.437208	4	5%	2.56	3.49
			2.5%	2.88	3.87
			1%	3.29	4.37

From Table 3 above, the bounds testing results reject the null hypothesis of no long-run relationship among the variables, as the F-test statistic value of 8.437208 exceeds all critical values. Thus, we reject the null hypothesis and conclude that there is cointegration in the model. This implies that there is a long run relationship between corporate bond performance and selected macroeconomic variables at the Nairobi securities exchange, Kenya.

Long-run relationship

Based on the long run coefficients in the table 3, government expenditure has a positive impact on corporate bond performance, while exchange rate and interest rate have a negative impact. The coefficient for inflation is positive, indicating that it has a positive impact on corporate bond performance.

Table 4: Summary of Long Run Relationship between Corporate bond performance and Selected Macroeconomic Variables (Dependent variable LNCORPB)

Variables	Coefficient	Std. Error	t-statistics	Probability
Constant	44.79269	8.647910	5.179596	0.0003
LnECH	-17.31179	3.745124	-4.622489	0.0007
LnGVEX	-0.578612	0.204137	-2.834429	0.0162
LnINF	3.095968	0.743539	4.163831	0.0016
LnINT	-3.293501	1.238672	-2.658897	0.0222

A 1-unit change in exchange rate produces a 17.3-unit negative change in corporate bond performance with a statistically significant coefficient (p=0.001). The long-run relationship reveals that the exchange rate has a negative effect on corporate bond performance, which is similar to the findings of (Hongmei, 2021).

A 1-unit change in inflation rate produces a 3.09-unit positive change in corporate bond performance with a statistically significant coefficient (p=0.0016). The long-run relationship reveals that the inflation rate has a positive effect on corporate bond performance, which contradicts the findings of Ngaruiya and Njuguna,(2017), but confirms the findings of (Mugo, 2018).

A 1-unit change in government expenditure produces a 0.5-unit positive change in corporate bond performance with a statistically significant coefficient (p=0.0016). This contradicts the findings of Maina and Kimutai, (2018), which suggest a positive effect of government expenditure on corporate bond performance.

A 1-unit change in interest rate produces a 3.3-unit negative change in corporate bond performance. The long-run relationship reveals that the interest rate has a negative effect on corporate bond performance, which confirms the findings of Hongmei, (2021), however it contradicts Chege, (2018) study which found the opposite effect.

Short-run relationship

Table 5: Summary of Short Run Relationship between corporate bond performance and Selected Macroeconomic Variables: ARDL Model (3, 0, 1, 2, 3)

		Dependent Variable CORPB		
Variables	Coefficient	Std. Error	t-statistics	Probability
D(LNCORPB(-1))	0.574399	0.161301	3.561033	0.0045
D(LNCORPB(-2))	0.371815	0.129694	2.866870	0.0153
D(LNGVEX)	-0.441484	0.113098	-3.903540	0.0025
D(LNINF)	1.764491	0.642135	2.747852	0.0190
D(LNINF(-1))	-1.452235	0.720710	-2.015006	0.0690
D(LNINF(-2))	-2.948681	0.649304	-4.541293	0.0008
D(LNINT)	-1.620126	2.631975	-0.615555	0.5507
D(LNINT(-1))	8.375356	2.757291	3.037530	0.0113
Ecm(-1) *	-1.776090	0.206979	-8.581015	0.0000
	R-squared = 0.873918	Adj R-Squared = 0.810877		

Table 5 above presents the results of the error correction model using the co-integration technique. The ECM model indicates a strong relationship between corporate bond performance (LNCORPB) and several macroeconomic variables, including inflation (LNINF), government expenditure (LNGVEX), exchange rate (LNEXCH), and interest rate (LNINT). Specifically, a one percentage point increase in the lagged values of LNCORPB, LNINF, and LNGVEX results in a 0.574, 1.764, and -0.441 decrease in LNCORPB, respectively. Moreover, a one percentage point increase in the lagged values of LNINT and LNCORPB two periods prior results in an 8.375 increase and a 0.372 decrease in LNCORPB, respectively. The empirical model also includes a CointEq (-1) term that represents the error correction term, which suggests that the long-run equilibrium relationship between the dependent variable and the independent variables is estimated to be -1.776, and a one-unit deviation from this equilibrium will be corrected by 1.776 units in the following period. The model's high R-squared value of 0.873918 suggests that the independent variables explain a significant portion of the variation in the dependent variable.

From the ARDL model results in Table 4, we find that the lagged values of corporate bond performance (CORPB) are positively and significantly suggesting that the current value of corporate bonds is positively influenced by its previous value, implying that the previous state of corporate bond turnover is a significant driver of its current value. The coefficients of government expenditure (LNEX), is negative and statistically significant, suggesting that an increase in government expenditure can have adverse effects on corporate bond performance in the Nairobi securities exchange. This is consistent with Keynesian theory, as higher government spending could trigger inflation and ultimately lead to higher borrowing costs and default risk (Keynes, 1936).This finding is in agreement with Cebula and Cuellar, (2010) study which argued that factors that cause federal deficits to go up could raise the cost of borrowing for firms due to increased competition for loanable funds.

The coefficients of exchange rate (LNECH) and inflation (LNINF) are negative and statistically significant, suggesting that an increase in, exchange rate depreciation, and inflation all have negative effects on corporate bond performance in Nairobi securities exchange. This is consistent with Shruthi and Suresha, (2015) findings which states that An increase in inflation rate tends to decrease one of the components of a yield curve, such as level, which causes investors to shy away from investing in corporate bonds., while exchange rate depreciation could increase the cost of servicing foreign-currency-denominated debt this corroborates Huang, Chang and Tian, (2018) who studied the

chinese bond market and came to the conclusion that when the Chinese currency (RMB) appreciates against the US dollar, exports increase, and corporation risk declines, causing corporate bond yield spreads to decrease. Conversely, when the RMB depreciates against the US dollar, corporations reduce exports, corporate risk rises, causing corporate bond yields to increase.

On the other hand, the coefficients of interest rate (LNINT) and its lagged values (LNINT(-1)) are negative but not statistically significant, implying that changes in interest rates have limited impact on corporate bond performance in nairobi securities exchange.The findings agreed with Björn and Johnsson, (2015) study of swedish corporate bond market. However the study disagreed with Chege, (2018) and Ndunda, (2018) studies which found a positive and significant association.

Diagnostic Tests

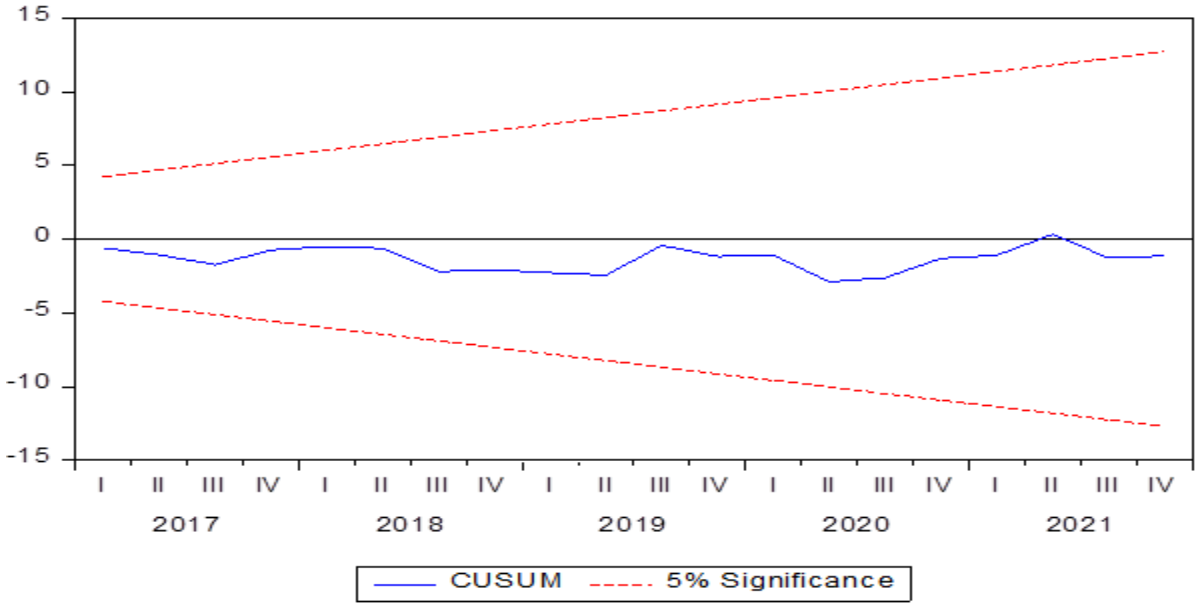
The post-estimation tests, which were carried out in this study, were heteroscedasticity, model specification test, autocorrelation and stability tests as shown in table 6 and Figure 1 respectively.

Table 5: Results of Diagnostic Tests

	F- Statistics	Probability
Breusch-Godfrey LM test for autocorrelation	0.324742	0.7269
Breusch-Godfrey-pagan test for Heteroskedasticity	1.169360	0.3612
Ramsey RESET Test	2.165442	0.1575
Normality Test	0.017561	0.769

The results of the diagnostic tests were also presented in table 5 above. The emphasis was on testing the presence or absence of serial correlation in the residuals generated from the models, Ramsey model specification test, heteroskedasticity test and stability test as well as the normality test. The serial correlation tests of the residuals were based on the Breusch-Godfrey LM test for autocorrelation. The estimated model Result from the second order tests indicates no presence of serial correlation in the model. Also, the Ramsey reset test result indicates no evidence of omitted variable problem in the results and the Breusch-Godfrey-Godfrey Heteroskedasticity test shows no evidence of heteroskedasticity in model. Additionally, the normality test shows that the residual is normality distributed.

Figure 1: Cusum Stability Test



Figures 1 indicates that the lines fall within the 5 percent significance level, suggesting that the model is robust and stable.

SUMMARY AND CONCLUSIONS

The study sought to find out the effect of macroeconomic variables on corporate bond performance of listed companies at the Nairobi securities exchange in Kenya. It applied the ARDL model developed by Pesaran, Yongcheol and Smith, (2001) using quarterly time series data for the period 2015 to 2022 to determine both long-term and short-term relationships. The findings indicated that all four macroeconomic variables had a significant influence on the performance of corporate bonds listed on the NSE in Kenya. Exchange rates had a negative effect on bond performance in the short run, and a long-term negative relationship was also observed. Government expenditure was found to have a negative impact on bond performance in both the short and long term. Inflation rates had a positive impact on corporate bond performance in the short term, with a negative relationship emerging in the second year while remaining positive in the first year. Interest rate was found to have a significant negative impact on corporate bond performance in the long run, with a negative short-term relationship. This study is in support of research carried out by Mugo (2018), Maina & Kimutai (2018), and Ngaruiya & Njuguna (2017), which found a long-run relationship between macroeconomic variables and corporate bond performance in Kenya.

POLICY RECOMMENDATIONS

- Economic planners should implement a strict monetary policy and control factors contributing to inflation rate changes to enhance bond performance, as fluctuations in inflation can negatively affect corporate bonds.
- The stability of the Kenyan shilling against major currencies such as the USD is crucial in supporting corporate bond performance, and policy interventions should be put in place to ensure a stable exchange rate.
- The government should monitor the impact of macroeconomic variables on economic growth in the future to facilitate smooth and predictable outcomes when making economic decisions.

REFERENCES

Aduda, J., Masila, J. M., & Onsongo, E. N. (2012). The Determinants of Stock Market Development: The Case for the Nairobi Stock Exchange. International Journal of Humanities and Social Science, 2(9), 214-230.

Ahwireng-Obeng, S. A. (2016). Performance determinants of local currency bond markets in African emerging economies. Johannesburg: University of Witwatersrand. Retrieved from http://hdl.handle.net/10539/23718

Bhattacharyay, B. N. (2013). Determinants of bond market development in Asia. Journal of Asian Economics, 24, 124-137. doi: https://doi.org/10.1016/j.asieco.2012.11.002.

Björn, S., & Johnsson, S. (2015). The Growth of The Swedish Corporate Bond Market. Gothenburg: University of Gothenburg. Retrieved from http://hdl.handle.net/2077/39814

Bretscher, L., Hsu, A., & Tamoni, A. (2020). Fiscal policy driven bond risk premia. Journal of Financial Economics, 1-48. doi: https://doi.org/10.1016/j.jfineco.2020.04.010

Cebula, R., & Cuellar, P. (2010, July). Recent evidence on the impact of government budget deficits on the ex-ante real interest rate yield on Moody's Baa-rated corporate bonds. Journal of Economics and Finance, 34(3), 301-307.

Chege, I. K. (2018). Effect of Macroeconomic Factors on The Development of Bond Market in Kenya. Nairobi: Uniiversity of Nairobi. Retrieved from http://hdl.handle.net/11295/105684

CMA. (2020). Quarterly Statistical Bulletin (QSB). Nairobi: Capital Markets Authority.

Gujarati, D. N., & Porter, D. C. (2009). Basic Econometrics. Boston: McGraw-Hill Irwin.

Hongmei, Z. (2021). Effect of Macro Economic Factors on Bond Performance in Kenya. Retrieved from http://erepository.uonbi.ac.ke/handle/11295/160799

Huang, J., Chang, K., & Tian, Y. (2018). Analysis of Macroeconomic Factors Affecting the Corporate Bond Yield Spread. Engineering Letters, 27(1), 120-130.

Hwang, S. (2016). Corporate bond market in Asia and the Pacific and its role in financing for development. Bangkok: UNESCAP.

Jerop, J. (2018). Macro-economic Factors and Corporate Capital Structure: Evidence from Firms Listed at the Nairobi Stock Exchange. Nairobi: University of Nairobi. Retrieved from http://hdl.handle.net/11295/10453

Keynes, J. M. (1936). The General Theory of Employment, Interest and Money. London: Palgrave Macmillan.

Kunwar, K. B. (2019). Impact of Government Expenditure in Economic Growth of Nepal: ARDL Approach1. CRAIAJ, 3(1), 33-40.

Kwamuma, P., & Weda, C. (2019). Influence of Macroeconomic Variables on Government Bond Performance at Nairobi. Strategic journal of business & change management, 6 (2), 1012 –1029.

Le, D., Nguyen, Q., & Nguyen, T. (2016). The Development of Corporate Bond Markets: A Cross-Country Analysis. International Journal of Economics and Finance, 8(1), 50-57. doi: https://doi.org/10.5539/ijef.v8n1p50

Maina, S. N., & Kimutai, G. (2018). Macro-economic variables and performance of corporate bonds at the Nairobi securities exchange. International Academic Journal of Economics and Finance, 3(2), 410-426.

Mega, A., & Widayat, W. (2019). Effect of Bond's Interest rate, Rating and Maturity Time Toward Bond's Yields. Manajemen Bisnis, 9(1), 99-106. doi: https://doi.org/10.22219/jmb.v9i1.9446

Mugo, M. (2018). Effect of Macroeconomic Factors on The Performance of The Bond Market in Kenya.

Ndegwa, E. N. (2016). The Effect of Macro Economic Variables on Stock Market Return at The Nairobi Securities Exchange. University of Nairobi thesis.

Ndunda, J. M. (2018). Effect of Interest Rate Risk on Bond Yield in The Kenyan Bond Market. Unpublished MBA Project. Retrieved from http://hdl.handle.net/11295/105888

Ngaruiya, M., & Njuguna, A. (2017). Influence of Inflation on Bond Prices: A Survey of Bonds Listed at The Nairobi Securities Exchange. American Journal of Economics, 50-63. doi: https://doi.org/10.47672/aje.137

Ogilo, F. (2014). The Effect of Selected Macro-Economic Variables on Bond Market Development in Kenya. DBA Africa Management Review, 4(2), 54-62.

Otieno, S. A. (2018). The Volatility Effects of Foreign Exchange on Financial Performance of The Bond Markets in Kenya. University of Nairobi. Retrieved from http://hdl.handle.net//11295/106357

Özlen, Ş. (2012). Macroeconomic Factors and Stock Returns (ARDL Approach). International Journal of Academic Research in Business and Social Sciences (IJ-ARBSS), 315 - 342.

Park, C.-Y. (2017). Developing Local Currency Bond Markets in Asia. Emerging Markets Finance and Trade, 53(12), 2826-2844. doi: https://doi.org/10.1080/1540496X.2017.1321539

Pesaran, H. M. (2015). Time Series and Panel Data Econometrics. Oxford: Oxford University Press.

Pesaran, H. M., Yongcheol, S., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. Journal of applied econometrics, 16(3), 289-326.

Shruthi, N., & Suresha, B. (2015). An Empirical Study on Impact of Changes in Macro Economic Variables on Bond Yield Curve - Evidence from Indian Corporate Bond Market. Research Journal of Finance and Accounting, 6(11), 103-109.

Tendulka, R., & Hancock, G. (2014). Corporate Bond Markets: A Global Perspective. Madrid: IOSCO Research Department.

Ukachukwu, E. O., & Odionye, J. C. (2020). Impact of Selected Macroeconomic Variables on Foreign Direct investment in Nigeria: Auto-Regressive Distributed Lag (Ardl) Model. International Journal of Economics, Commerce and Management, VIII (12), 41-55.

Vartholomatou, K., Pendarak, K., & Tsagkanos, A. (2020). Corporate bonds, exchange rates and memorandum: Evidence from Greece and Ireland. International Journal of Finance & Economics, 1-6. doi:DOI: 10.1002/ijfe.2333

Waweru, T. W. (2014). The Effect of Macro Economic Variables on the Liquidity of Infrastructure Bonds Listed at Nairobi Securities Exchange. Nairobi: University of Nairobi.