Foreign exchange rate movement and long-term sovereign bond yield curve movements in Kenya

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Abstract

The primary aim of this study was to examine the effect of exchange rate movements on Kenyan government treasury bond yields during the period 2002-2022. The study utilized monetary policy to assess its moderating effect on the relationship between the dependent and independent variables. Data for this research was obtained from secondary sources, including the Kenya National Bureau of Statistics, the Central Bank of Kenya, and Thompson Reuters, as all variables considered were only available through these sources. Using quarterly data spanning 20 years (2002-2022), amounting to approximately 80 observations, the analysis was conducted with E-Views 12 based on the study's objectives. Descriptive statistics summarized the data, while correlation and multiple regression analyses examined the relationship between government bond performance and exchange rate movements. Prior to analysis, stationarity tests and other diagnostic procedures were performed. The results indicated a significant impact of exchange rate movements on 20-year government bond yields. An increase in the exchange rate was associated with a positive change in bond yields, suggesting that currency fluctuations can influence bond yields, potentially reflecting the effects of currency movements on investor behavior in the bond market.

1. Introduction

A bond yield spread is defined as the difference between the yield to maturity of a bond (corporate bond) and the yield to maturity of risk-free securities (government bond) (Goldstein & Namin, 2023). The changes in bond yields are considered a significant aspect of financial markets, particularly in the bond market, as they play a crucial role in the pricing of corporate bonds. Additionally, changes in bond yields help determine the returns of hedge fund managers who take a leveraged long position in corporate bonds combined with a short position in government bonds to hedge against interest rate risk (Abbas & Christensen, 2007). In assessing the bond spread yield, evaluation and assessment of possible risks are very important as they help identify their required return (Adelegan & Radzewicz-Bak, 2009). Some of these risks include default risks, liquidity risks, and time to maturity risk. Corporate bonds should offer a yield that compensates for such risks, as investors will always consider bond yields through comparison with a standard, mostly taken to be government bonds, enabling the calculation of yield spread (Afflatet, 2019).

Financial systems over the years have largely depended on lending activities, with little effort directed towards other forms of financing, such as bond securities (Goldstein & Namin, 2023). Indeed, over the last 20 years or so, global financial crises and contagions that have taken place have led to major economic meltdowns, such as the inability to raise finances from international markets. This has been a significant impetus for debates on how to ensure that well-developed domestic capital markets are established (Goldstein & Namin, 2023). For example, in Asia, researchers observed that the existence of local capital market facilities and financing could have mitigated the severe aftereffects of the East Asian financial crisis (Afflatet, 2019). As a result, many developing markets such as Latin America, Africa, and the Asian market have realized that developing deep and liquid domestic capital markets could reduce emerging economies' exposure and vulnerability to financial crises (Ahl & Advisory, 2014).

Local capital market development, therefore, has been a major driver of extended economic growth both in the short and long run (Ahmad, Muhammad, & Masron, 2009). According to Ahmed (2006), on a practical note, the diversity of capital market products has developed, ranging from mutual funds, hedge funds, unit trusts, REITs, and stock brokerage services, creating a more lucrative investment environment in the capital market sector (Alesina & Tabellini, 1990). Capital markets of developing countries have also been growing rapidly, providing a significant change and development that have met the rising complex financing and economic needs of these states (Alshogeathri, 2011). One of the most integral parts of these capital markets is the increasing development of the bond market and its rapid growth (Altman, 1989).

1.1. Statement of the Problem

Performance of Kenya's corporate bonds has mostly been poor Aßmann and Boysen-Hogrefe (2012). Various studies, such as Battaglini and Coate (2008), indicate that the debt market in Kenya is thin and also underdeveloped. In Kenya, the debt market accounts for less than ten percent of the total dealings in bonds at the NSE (Calomiris, Himmelberg, & Wachtel, 1995). According to Alshogeathri (2011), most debt markets in Africa face challenges such as poor performance, high volatility, and inefficiencies. As stated by Bektić, Hachenberg, and Schiereck (2020), though Kenya's bond market is well diversified, it needs further development.

For a long-term investor, whether in equity or bonds, unstable volatility is a concerning aspect of the market since it is associated with negative returns, and momentum tends to produce better results when volatility is predictable, steady, or stable (Ahl & Advisory, 2014). Bond performance fluctuations and turbulence experienced in bond markets are undesirable phenomena that most investors find puzzling and intrusive (Budina & Mantchev, 2000). With capital markets developing at a fast rate, cases of volatility come as a surprise after long periods of price stability and low inflation (Calomiris et al., 1995). These instances of bond market turbulence have raised questions such as whether markets have become too powerful, with volatility influenced by the demands of the financial marketplace, and whether this case of volatility reflects economic fundamentals or if it is merely self-generated forces across markets bearing little relation to such fundamentals (Bektić et al., 2020). In Kenya, the bond yield rate was 14% from 2006 to 2022. It dropped to 6% from 2010 to 2012, then rose to 13% from 2014 to 2016. According to Bengoechea (2012), every investor, including bond investors, is opposed to a highly volatile market and would prefer to invest in a market with a high Sharpe ratio and/or low volatility. Comparatively, varying and conflicting results have emerged with an array of factors known to drive the volatility of bond yield spreads in most markets and/or countries (Bektić et al., 2020).

Bhat, Shanmugasundaram, and Fahad (2016) assume that the cost of bonds maturing in different periods can be affected by common economic factors, but the implications and strength of their effects vary. Observation of such factors and consideration of their influence on the yields of government bonds are vital when making decisions in capital markets, particularly during periods of crisis and with the constantly evolving methods of financing (Becker & Ivashina, 2015).

The relative position of bond yields across different maturities and the correlation of nominal yields can be hypothetically explained by economic factors such as the term structure of interest rates, GDP, budget deficit, exchange rate, international reserves, and current inflation (Bhat et al., 2016). According to Ngugi, Amanja, and Maana (2006) and Altman (1989), very little research focuses on the problem, especially in countries that are emerging markets and developing economies, owing to their relatively short history, illiquidity, difficulties in gathering data, and narrow data scope. Therefore, a systematic investigation of government bond yields' behavior with respect to factor analysis is relevant and arouses interest (Ngugi et al., 2006). Although the Kenyan bond market is developing rapidly, not much is understood regarding the causes of bond yield fluctuations and changes (Bessembinder, Spatt, & Venkataraman, 2020). Studies on the Kenyan bond market's performance are very limited; most of them concentrate on the uptake of bonds and the performance of corporate bonds, with very few focusing on sovereign or government bonds (Ngugi et al., 2006).

Therefore, this study is informed by the problem stated above and seeks to examine variables across the market, including macroeconomic and financial aspects, and how they influence the Kenyan government bond market yield.

1.2. General Objective

Macroeconomic indicators and long-term sovereign bond yield curve movements in Kenya.

1.3. Specific Objectives

i. To determine the impact of exchange rate movements on the sovereign treasury bond yield curve in Kenya.

ii. To determine the moderating effect of procyclical monetary policies (interest rate policy) on exchange rates, public debt growth, international reserves, and GDP growth on Kenyan government treasury bond yield volatility.

2. Theoretical Review

2.1. Liquidity Preference Theory

The liquidity preference theory was originally first coined by Budina and Mantchev (2000). According to Maynard Keynes, people value money for the purposes of conducting current business and as a means of storing wealth. Keynes purports that individuals tend to give up interest earnings on their money in order to spend their money in the present (Cashell, 2010). This, in economic terms, is referred to as the precautionary motive, where individuals hold money on hand for immediate measures (Chen, Lesmond, & Wei, 2007). The second perspective of this theory is that when higher interest rates are offered, individuals become more willing to hold less money on hand in order to gain profit in the long run. Liquidity preference theory explains the concept of demand for money, also called liquidity (Chen, Liao, & Tsai, 2011).

Keynes in liquidity preference theory asserts that individuals usually have speculative motives too (Cheng & Phillips, 2014). He asserts that since bond prices may begin to decrease significantly or fall, this presents investors with an opportunity to use their transitionary liquid funds to engage in investments that offer a more attractive rate of return (Goldstein & Namin, 2023). Therefore, speculative motives of individuals refer to the general reluctance to invest money today due to the fear of missing out on better opportunities in the future (Goldstein & Namin, 2023).

With the ever-changing economic environment, other researchers have engaged in theoretical developments of Maynard's liquidity preference theory (Cuadra & Sapriza, 2008). Liquidity preference theory is originally built on the belief that money has more functionalities than just a means of circulation, but can also be viewed as a means and a form of wealth, an asset (Whalen, 1966). The post-Keynesian approach to liquidity preference involves generalizing the theory into a broader framework of asset choice and capital accumulation, following Keynes's general theory (Fontana, 2003). Liquidity in post-Keynes developments can only be related to money or bonds. In this dichotomous world, the cost paid on bonds can only be a reward for their lower degree of liquidity compared to money (Harcourt, 2016).

According to the liquidity interest theory, favor load on passing securities is further down for the sake of investors who are sacrificing less liquidity than they do by investing in medium-term or long-term securities (Kurihara, 2013). The Liquidity Preference Theory states that prolonged interest rates not only reflect investors' expectations about future interest rates but also include a premium for holding long-term bonds, referred to as the term premium or the liquidity premium (Chick & Dow, 2002). This premium rewards investors for the additional risk of holding their money or tying it up for a longer period, including the greater price uncertainty. Due to the term premium, long-term bond yields tend to be higher than short-term yields, and the yield curve slopes upward (Coakley, Flood, Fuertes, & Taylor, 2005).
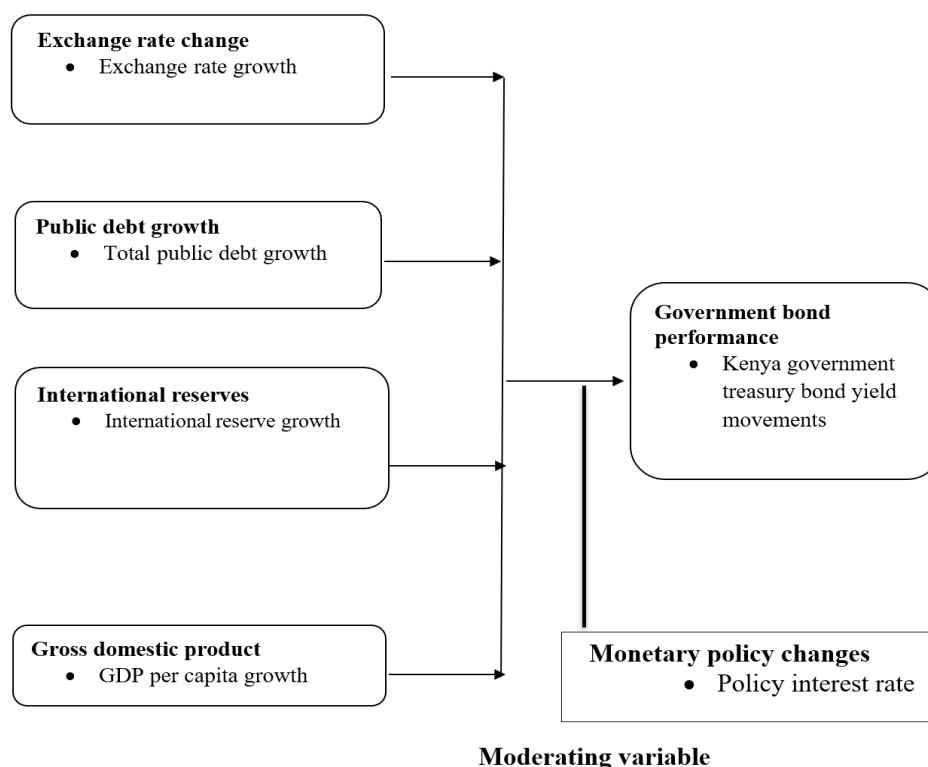
Figure 1. Conceptual framework.

Figure 1 illustrates the relationship between the independent variable and the dependent variable.

3. Conceptual Framework

3.1. Exchange Rate Changes

In economics, the exchange rate is the rate at which one currency is exchanged for another. In other words, it can be referred to as the price of purchasing another currency. This rate is usually determined by forces of demand and demand in the foreign exchange market. This market is open to a wide range of different types of buyers, and trading takes place 24 hours a day worldwide. In any given country, the exchange rate usually affects the economy by influencing the prices of commodities and assets traded. A market-based exchange rate will change whenever the values of either of the two component currencies change. A currency becomes more valuable whenever demand for it exceeds the available supply. Conversely, it becomes less valuable whenever demand is less than the available supply.

Exchange rate volatility refers to the tendency for foreign currencies to appreciate or depreciate in value, thus affecting the profitability of foreign exchange trades. When exchange rates are floating, as opposed to fixed exchange rates, they are likely to fluctuate depending on the strength of the economies involved. As a result, volatility impacts any business undertaking involving two different countries. In any economic environment, a stable exchange rate is perceived as important since it encourages the development of a country's capital market. Bond markets are perceived to develop in a regime where the exchange rate is either pegged or relatively fixed, posing minimal risk to investors.

4. Research Methodology

A correlational research design was employed in this study. It determines the specific tools the researcher selects and helps explain relationships (Saunders, Lewis, & Thornhill, 2003). The data relevant to this study were secondary. This was because all the independent variables that were used to determine the dependent variable could be obtained from secondary sources. According to Budina and Mantchev (2000), data processing involves editing, coding, classification, tabulation, and graphical presentation. The data collected was time series data and analyzed quantitatively using E-Views 12. Preliminary data analysis was conducted to determine the most suitable model for the study. Multiple regression models were used to examine the relationship between bond performance and the four independent variables or determinants.

5. Results and Discussions of the Findings

5.1. Descriptive Statistics

As per the charts, there was no indication of a specific trend in each variable. The descriptive analysis mainly focuses on the average, minimum, or maximum scores that each of the macroeconomic variables has reached,

including the 20-year bond yield. Exchange rate growth over the 12-year period (48 quarters) averaged 0.8% (0.08), with a maximum value of 12.5% (0.125) experienced in late 2011 by Kenya. The minimum growth rate of -15.3% (0.153) was observed in the same year in a later quarter. Exchange rate growth had a standard deviation of 0.038, indicating low variability during the 20-year period under study. High volatility in exchange rates creates an unpredictable economic environment that dissuades most investment practices. The exchange rate growth exhibited a negative skewness of -0.799, suggesting that the market was experiencing negative or downward price movements in exchange rates. The implication is that a lower-valued currency makes a country's imports more expensive and its exports less expensive in foreign markets.

To evaluate the effect of the exchange rate on government treasury bond yield.

Table 1. The effect of the exchange rate on government treasury bond yield.

Statistic / Variable	Coefficient	Std. error	Z	P>|z|	95% conf. interval
EXCG	0.1543	0.0375	4.12	0	$0.0809 - 0.2278$
_cons	15.542	0.5976	26.01	0	$14.3708 - 16.7132$
Model Summary					
Number of observations	80				
Number of groups (Panels)	20				
Observations per group (Min)	4				
Observations per group (Avg)	4				
Observations per group (Max)	4				
Within R-squared	0.2841				
Between R-squared	0.4385				
Overall R-squared	0.2708				
Wald chi² (1 df)	16.98				
Prob > chi²	0				
corr(u_i, X)	0 (Assumed)				
Sigma_u	1.094				
Sigma_e	1.0649				
Rho (Fraction of variance due to u_i)	0.5135				

Table 1 presents the regression results for the variable EXCG (Exchange Rate) using a random effects panel data model. The coefficient of EXCG is 0.1543, with a standard error of 0.0375. The z-value is 4.12, and the associated p-value is 0.000, indicating that the effect of the exchange rate on the dependent variable is statistically significant at the 1% level. The 95% confidence interval ranges from 0.0809 to 0.2278, suggesting that the true coefficient is likely to lie within this interval. The model also includes a constant term (_cons), which has a coefficient of 15.542 and a standard error of 0.5976. The z-value of 26.01 and a p-value of 0.000 confirm that the intercept is highly significant. The 95% confidence interval for the constant term lies between 14.3708 and 16.7132.

The overall R-squared coefficient, which measures the proportion of variance explained by the model, was found to be 0.2708. This suggests that the model accounts for approximately 27.08% of the total variance in the data. The within-group R-squared was 0.2841, indicating that 28.41% of the variation in BYG can be attributed to variations within the panels, while the between-group R-squared was 0.4385, signifying that 43.85% of the variation is due to differences between the panels.

Table 2. Moderating effect of procyclical monetary policy interest rate policy changes on the relationship between exchange rate and Government treasury bond yield.

Statistic / Variable	Coefficient	Std. error	z	P>|z|	95% conf. interval
x1z	0.29	0.0624	4.65	0	0.1676 − 0.4123
_cons	12.9994	1.0115	12.85	0	11.0169 − 14.9819
Model Summary					
Number of observations	80				
Number of groups (Panels)	20				
Observations per group (Min)	4				
Observations per group (Avg)	4.1				
Observations per group (Max)	5				
Within R-squared	0.2175				
Between R-squared	0.7261				
Overall R-squared	0.3979				
Wald chi² (1 df)	21.59				
Prob > chi²	0				
corr(u_i, X)	0 (Assumed)				
Sigma_u	0.6451				
Sigma_e	1.1169				
Rho (Fraction of variance due to u_i)	0.2502				

Table 2 exhibits the results of the random-effects generalized least squares (GLS) regression model, which examines the relationship between the Kenyan 20-year government bond yield (BYG) and the exchange rate moderated by interest rate (x1z), revealing important insights.

Firstly, the model's R-squared values indicate the extent to which the included variables explain the variation in bond yields. The within-group R-squared value of 0.2175 suggests that approximately 21.75% of the total variance in bond yields can be attributed to the exchange rate moderated by the interest rate, indicating a moderate relationship.

The coefficient for x1z is 0.2899 with a standard error of 0.0624. This coefficient is statistically significant ($p < 0.001$) and indicates that an increase in the exchange rate, moderated by interest rates, leads to a positive and significant increase in the Kenyan government bond yield. The 95% confidence interval for the coefficient (0.1676 to 0.4123) does not include zero, further confirming the statistical significance of this relationship.

The intercept (_cons) has a coefficient of 12.9994 with a standard error of 1.0115. This coefficient represents the bond yield when the exchange rate is moderated by the interest rate is zero. It is also statistically significant ($p < 0.001$), indicating that even in the absence of exchange rate effects, there is a significant base level of bond yield.

The Wald chi-squared test statistic of 21.59 with 1 degree of freedom is highly significant ($p < 0.001$), suggesting that the model, including only x1z, is a good fit and that the exchange rate, moderated by interest rate, is a strong predictor of bond yields.

In summary, these findings indicate that exchange rate movements, particularly when moderated by interest rates, have a significant and positive impact on the Kenyan 20-year government bond yield. An increase in the exchange rate, under these conditions, is associated with a higher bond yield.

6. Conclusions
6.1. Impact of Exchange Rate (EXCG) on Bond Yields (BYG)

The analysis indicates that changes in the exchange rate (EXCG) have a statistically significant impact on bond yields (BYG). An increase in the exchange rate is associated with higher bond yields, suggesting a potential relationship between currency movements and investor behavior in the bond market. This implies that currency fluctuations should be considered when evaluating bond market dynamics and investment strategies. The exchange rate (EXCG) can substantially influence bond yields (BYG). A depreciation of the currency can increase inflation risk and decrease the real value of future bond returns, which tends to elevate bond yields. Conversely, if the exchange rate appreciates, it can lower yields as the real value of returns increases. It is important to remember that bond prices and yields move inversely; when yields rise, bond prices generally fall, and vice versa. This finding was supported by studies such as Adelegan and Radzewicz-Bak (2009), whose results show that domestic bank credit, exchange rate variability, absence of capital controls, and the fiscal balance load positively and significantly, while interest rate variability and GDP per capita have negative and significant effects.

7. Recommendations

7.1. Impact of Exchange Rate (EXCG) on Bond Yields (BYG)

Given the significant impact of exchange rates on bond yields, investors and financial institutions should consider monitoring currency fluctuations closely when making investment decisions in the bond market. Implementing effective currency risk management strategies, such as hedging, can help mitigate the potential adverse effects of exchange rate movements on bond portfolios.

Officers do not ensure the full implementation of the loan, especially through supervision of the usage of the money by the borrower. This increases the chances of misuse by the corporate customers, leading to a high rate of default by the clients. Non-business loans have a high rate of delinquency among corporate clients; these loans include car loans, mortgages, as well as general loans applied for by corporate customers, such as holiday loans. This is because the loans do not generate income, and thus, uncertainty from other anticipated sources fuels the increased rate of delinquency by the corporate clients. Different loans have prescribed recovery procedures based on policies, and thus, the bank should strictly follow and impose these procedures on borrowers to reduce the high rate of delinquency.

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