http://journals.uonbi.ac.ke/index.php/adfj
ISSN 2522-3186

African Development Finance Journal http://journals.uonbi.ac.ke/index.php/adfj
December Vol 4 No.3, 2022 PP 104-117 ISSN 2522-3186

Liquidity and Treasury Bonds in Kenya

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Abstract

The objective of this study was to determine the relationship between the bond liquidity and bond yields of treasury bonds in Kenya. The study adopted descriptive, correlational and longitudinal research designs to collect measure and analyse the data for 10 years period beginning January 2009 to December 2018. Fixed Effects Model and Random-effects regression analysis were used to test the formulated null hypothesis of the study. The study found out that bond liquidity was a significant predictor of bond yields. Bond liquidity accounted for the variance in bond yields of treasury bonds in Kenya. This study contributes to the existing knowledge in academia and provides insights into the Treasury bond market. Especially on influence of bond liquidity on the yields of treasury bonds considering that there are few empirical evidence in the finance literature. The study recommends that the central bank of Kenya should engage the Nairobi Securities exchanges and design good policies that could increase trading of treasury bonds at the secondary market to deepen the Treasury bond market and promote financial inclusion. It also recommends policy shift and improvement of understanding of the available government bond products and improved customer care practices that would increase trading and trader's subscription at Nairobi Securities Exchange. This study used bond liquidity as the independent variable and Bond Yields as the dependent variable of the study. A further research can be conducted to established whether the revere relationship of the variables hold water. The findings for this study are useful in Kenyan context. The study suggest further studies conducted in Africa to confirm or refute the finding of this study.

Keywords: Bond Liquidity, Yields, Treasury Bonds

Introduction

Liquidity attribute affects expected returns by way of liquidity premium embedded on bond prices (Goyenko, Subrahmanyam & Ukhov 2016).). Vital considerations before traders decide to invest in bonds market is the bond yields, they would receive as returns for investments (Collins & Fabozzi, 2000). The growth of bond markets is facilitated by efficient and liquid bond market and in such markets, there is always a benchmark yield curve for pricing of assets (Dick-Nielsen, Feldhutter, & Lando, 2012). Other studies are of the view that bond yields enhance liquidity and not the vice versa (Acharya & Pedersen (2003;

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Chen, Lesmond & Wei 2007). Hence, scholars find securities markets a dynamic field and so it has attracted different schools of thought on the influence of bond liquidity on bond yields of treasury bonds and ultimately interesting to comprehend how and why, the elements influencing bond yields vary over time.

Liquidity preference theory anchored the relationship between bond liquidity and yields of treasury bonds, with other theories offering diverse perspectives including, microstructure theory and the expectations theory. Keynes (1936), developed the liquidity preference theory where he postulated that investors prefer liquid and high interest rates on long-term bonds as compared to short-term securities, which are illiquid. While the microstructure theory by O' Hara (1995), opine that assets are traded under specific and explicit laid down trading mechanisms. Then expectations theory advanced by Hicks (1939), and Lutz (1940), postulate that yield curve shape reflects investors' expectations about future interest rates.

Research Problem

Bonds market continues to exhibit unreliable and erratic yields, liquidity tightness, information asymmetry, bonds under subscriptions and severe structural shortage of bonds (Thotho, 2017). According to Amihud, Mendelson, and Pedersen (2005), liquidity is a crucial feature in the market for it affects bond yields by liquidity premiums attached in bond prices. Scholars have attempted to explain factors that drive yields of treasury bonds and they have failed to reach to a consensus. According to Acharya and Pedersen (2003), Chen, Lesmond and Wei (2007), sensitive securities are more liquid and have substantially higher yields. Differing views are that bond yields determine the liquidity premium demanded from investors for longer-term investments (Goyenko, Subrahmanyam & Ukhov (2016). On contrary Codogno, Favero and Missale (2003) assert that liquidity differences have no impact on bond yields and they are insignificant without other market factors. The effect of bond liquidity on yields is insignificant (Thupayagale 2015). Contrary, Thotho (2017) argued that liquid bonds offered lower prices and were more attractive to traders, hence translated to better yields .While on the other hand Weda, Namusonge, and Oloko (2014) found out that the benchmark bond yields affected the bonds liquidity at NSE.

Globally, Goyenko, Subrahmanyam and Ukhov (2016), found that bond liquidity influenced the efficacy interest rate discovery and aided in yields formation. Contrary, Favero, Pagano and Thadden (2007) and Codogno, Favero and Missale (2003), they found that bond liquidity was not economically important in determination of yields. Ngugi and Agoti (2010) analyzed microstructure elements of the bonds market in

Kenya. He found insignificant influence of bond liquidity on yields. While, Thotho (2017) adopted generalized auto regressive conditional heteroskedasticity (GARCH) to analyze benchmark bond programmes and yield curve development in Kenya. He found out that little could be explained on the relationship between the illiquidity and yields. Nwiado and Deekor (2013), examined the domestic bond market and the development of the Nigerian Capital Market using applied financial econometrics model. They found high liquidity, lowered the bond yields. Lartey and Li1 (2018) examined daily frequency zero coupon yield curve of government bonds in Ghana. They found a positive relation between the liquidity of bonds and the yields. While, Weda, Namusonge, and Oloko (2014) examined the effect of government benchmark bonds to the liquidity of the bond market in Kenya during 2001 and 2012. They found an inverse relationship between the bond liquidity and yields. That bond yields directly affected the liquidity of bonds. There is yet no consensus on the effects of the bond liquidity on yields of treasury bonds and hence need to conduct further studies to unravel the puzzle.

Research Objective

The general objective of this study was to establish the effect of bond liquidity on bond yields of treasury bonds in Kenya.

Literature Review

Different scholars have argued that bond liquidity leads to effective yield curves. Goyenko, Subrahmanyam and Ukhov (2016), of USA researched on the term structure of bond market liquidity of US treasury market. Daily quoted bid/ask prices from treasury was used from November 1967 to December 2005. The data was collected from the Center for Research of Security Prices (CRSP) and analyzed using vector auto regression. They find that bond liquidity influences the efficacy interest rate discovery and aids in yield curve formation. The findings indicated that bond liquidity correlated bond yields. However, the study conducted in developed economy that differed from Kenya in terms of economic growth rate and bond capitalization and its findings could be limited to USA. The study also used nonlinear models that are sensitive to outliers making the findings inaccurate since they do not account for the individuality of the data.

Daily frequency zero coupon yield curve of government bonds were examined in Ghana by Lartey and Li1 (2018). Piecewise cubic Hermite interpolation method was adopted to analyze data from the Central Securities Depository of Ghana for 3 months and 15 years. They found a positive relation between the liquidity of bonds and the yields. This study adopted nonlinear methodology that is unable to account for

heteroscedasticity in data analysis and the results may differ when conducted under linear methodology. The current study adopted a correlational, descriptive and longitudinal research design and use of linear regression equations.

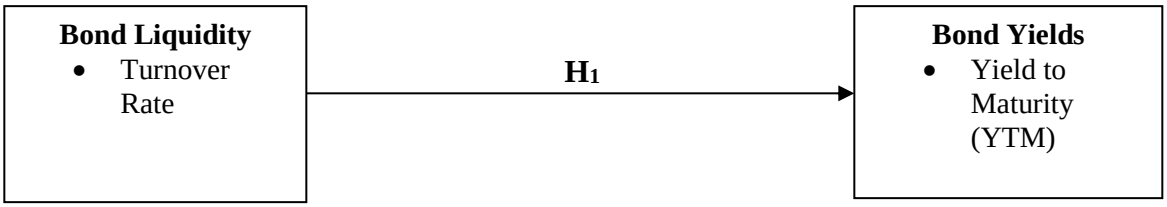
Contrary some other studies had a differing view on bond liquidity and yields. Codogno, Favero and Missale (2003), reviewed government bond spreads. This study was conducted in USA in 2002 using vector error correlation model to estimate daily data on national debt and bond yield spreads. They found there was no relationship between the two variables. That liquidity differences had no impact on yield spreads and that the effect of liquidity was insignificant without factoring the risk factors of government bonds. This study was limited to developed economies that have developed securities markets, advanced technology and high liquidity as compared to Kenya hence its findings were limited. There was a need to conduct a local study. Weda, Namusonge, and Oloko (2014) examined the effect of government benchmark bonds to the liquidity of the bond market in Kenya during 2001 and 2012. Data from CBK and NSE contained bid-ask spread, tenor structure and volume of issuance of treasury bonds was analyzed using the descriptive survey model. They found an inverse relationship between the bond liquidity and yields. That bond yields directly affected the liquidity of bonds. This study contradicts the earlier studies that found out that bond yields were influenced by the bond liquidity. This study established the relationship between the bond liquidity and the bond yields in Kenya.

While, Favero, Pagano and Thadden (2007), analyzed on how liquidity affected government bond yields in Euro area. The daily benchmark prices and liquidity measures were collected from January 2002 to December 2003 and analyzed using descriptive statistics. They found that liquidity was not economically important in determination of yields. This study was only limited to developed economies hence its findings were limited. The relationship between bond liquidity and yield curve were inconclusive as evidenced by number of studies therefore there was need to introduce moderating variables to resolve the gaps identified. Guided by this literature it was true that arguments were contradictory and inconclusive, hence leaving gaps in the literature. Therefore, understanding the dynamics of bond liquidity and bond yields is paramount to most economists and ultimately interesting to comprehend how and why, the elements influencing bond yields vary over time. Hence empirical studies are yet to conclusively to answer this question: was there relationship between the bond liquidity and bond yields of treasury bonds in Kenya?

To address the above research question, the study addressed the objective through the following null hypothesis:

H_{01}: There is no significant effect of bond liquidity on bond yields of treasury bonds in Kenya.
The hypothetical relationships were as presented in Figure 1 below.

Figure 1: Conceptual Model



Research Methodology

This study adopted descriptive, correlational and longitudinal research designs to collect measure and analyze the daily data. A population of seven Kenyan treasury bonds, which were actively trading at the secondary market and had bond tenor of 5 years and above. Using the criterion technique, the bonds that met these criteria were 5-year bond, 10-year bond, 12-year bond, 15-year bond, 20-year bond, 25-year bond and 30 years bond constituted in CBK Treasury bond series. The study measured the independent variable, which was bond liquidity with turnover rate (Amihud; Mendelson, 1991; Vayanos, Dimitri & JiangWang, 2012; Hameed 2018; Thotho 2017; Ghosh & Revilla 2007; Sarr & Lybek 2002; and Koech 2012). The measurement for bond yields was be the yield to maturity (YTM), expressed as [(Face value / Present value) $^{1/\text{Time period}}$]-1 (Brandt & Kavajecz, 2004; Lartey & Li1, 2018; Thupayagale, 2015; Balozi & Njogo, 2017; Fabozzi 2000; & Nevitt, & Fabozzi 2000).

Descriptive statistics and inferential statistics were employed to analyze data. The study used means, median, standard deviations, minimum, maximum, skewness and kurtosis to compare, analyze and draw findings on bonds liquidity and yields of treasury bonds. Hausman specification test was used to check the suitably panel data models that is fixed or random effect for the study dataset (Raya & Hendrawan, 2021). The Breusch-pagan Lagrange multiplier (LM) test was used to select between a random effects regression

and a simple OLS regression. The null hypothesis in the LM test was that variances across entities were zero, that is, there was no significant difference across units that is no panel effect, (Laureti & Leogrande, 2021; Raya & Hendrawan, 2021).

Simple and multiple linear regressions was used to test the statistical significance of the independent on dependent variables. To establish the effect of bond liquidity on bond yields of treasury bonds in Kenya, the following model was used;

$BY_{it} = \beta 0 + \beta 1\ BL_{it} + \varepsilon_{it}$

Where:

$\beta 0$=Population Y intercept/ Regression constant,

$\beta 1$=Population slope coefficient,

BY_{it}=Bond Yield where i = bond and time= t,

BL_{it}=Bond Liquidity where i = bond and time= t and ε_{it} is the error term

Descriptive Statistics

In Table.1, the descriptive statistics of the study variables are presented. Bond Liquidity had a minimum of zero, maximum of .26, mean of .005 and standard deviation of .0085. Bond liquidity is positively distributed with skewness of 6.96 (standard error 0.25). The skewness for a normal distribution should be zero, and any symmetric data should have a skewness near zero. Meaning that the data distribution is positive for the skewness indicating that data has the right tail is long relative to the left tail. Negative values for the skewness indicate data skewed left. The Kurtosis has a value of 113.9 with a standard error of 0.51. The kurtosis for a standard normal distribution is three. The standard normal distribution should have a kurtosis of zero. In addition, positive kurtosis indicates a "heavy-tailed" distribution and negative kurtosis indicates a "light tailed" distribution. This indicated excess kurtosis (leptokurtic distribution).

The minimum and maximum values of bond yields were 2.05 and 76.13 respectively with a mean of 11.56 and standard deviation of 2.46. The bond yields positively distributed with skewness of 2.05 indicating that data the right tail is long relative to the left tail. The kurtosis was above the value of three (67.76) with standard error of 0.51, implying the excess kurtosis (leptokurtic distribution).

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Table 1: Summary of Descriptive Statistics.

Variable	N	Minimum	Maximum	Mean	Standard Deviation	Skewness		Kurtosis	
						Statistic	SE	Statistic	SE
Bond Liquidity	9262	.00000	.26	.0051	.0085	6.96	.025	113.9	.051
Bond Yields	9262	2.0500	76.13	11.56	2.4623697	2.05	.025	67.76	.051

Source: Researchers Computations (2022)

Figure 2 indicates that the bond liquidity of treasury bonds at Nairobi securities exchange had registered unstable growth over the 10 years. It was evident that there was an ascending curve in all bonds between 2009 and 2010. This could be associated with the automaton of treasury bonds at Nairobi securities, which had eased trading hindrances. Then as from 2011 to 2018 shown an erratic behavior of turnover rate. An indication of unstable traded and issued bonds at NSE. This could be attributed to other forces of the market like the demand and supply of treasury bonds in the market. The 30-year bond recorded sharp decline in price dispersion.

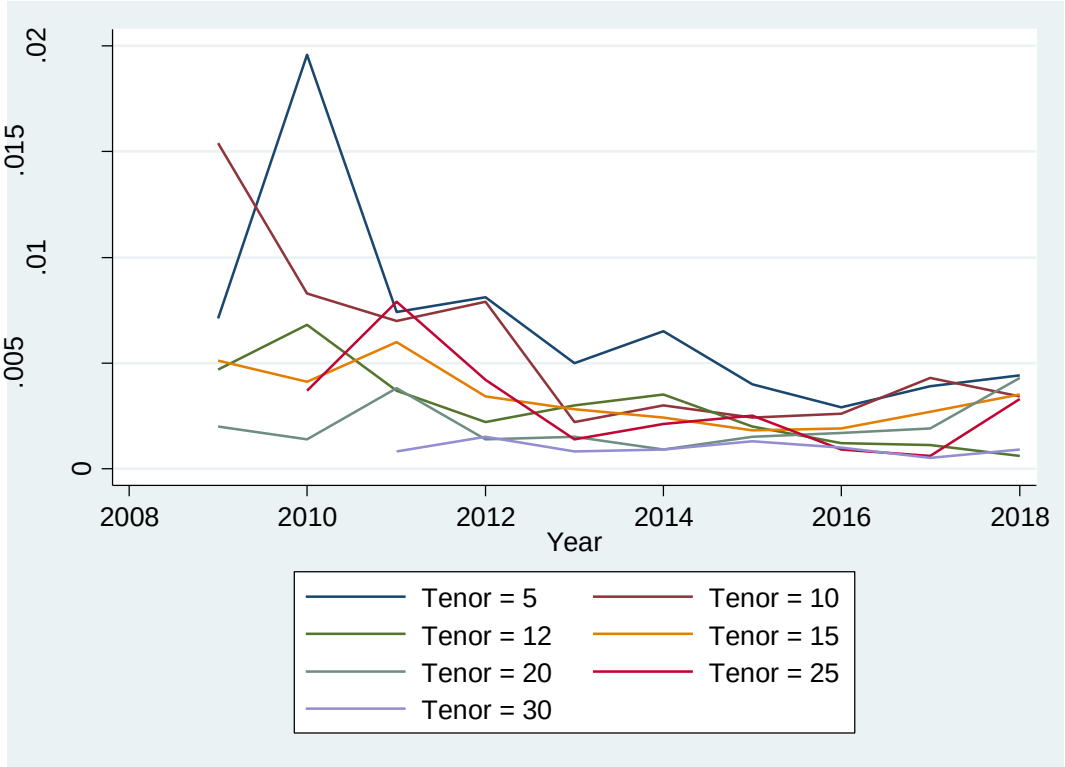

Figure 2: Bond liquidity

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ISSN 2522-3186

Figure 3 presents changes in yields (yield to maturity) of treasury bonds in Kenya for the seven treasury bonds from 2009 to 2018. The graph indicates an irregular growth of bond yields and that Nairobi Securities market is developing and unsteady.

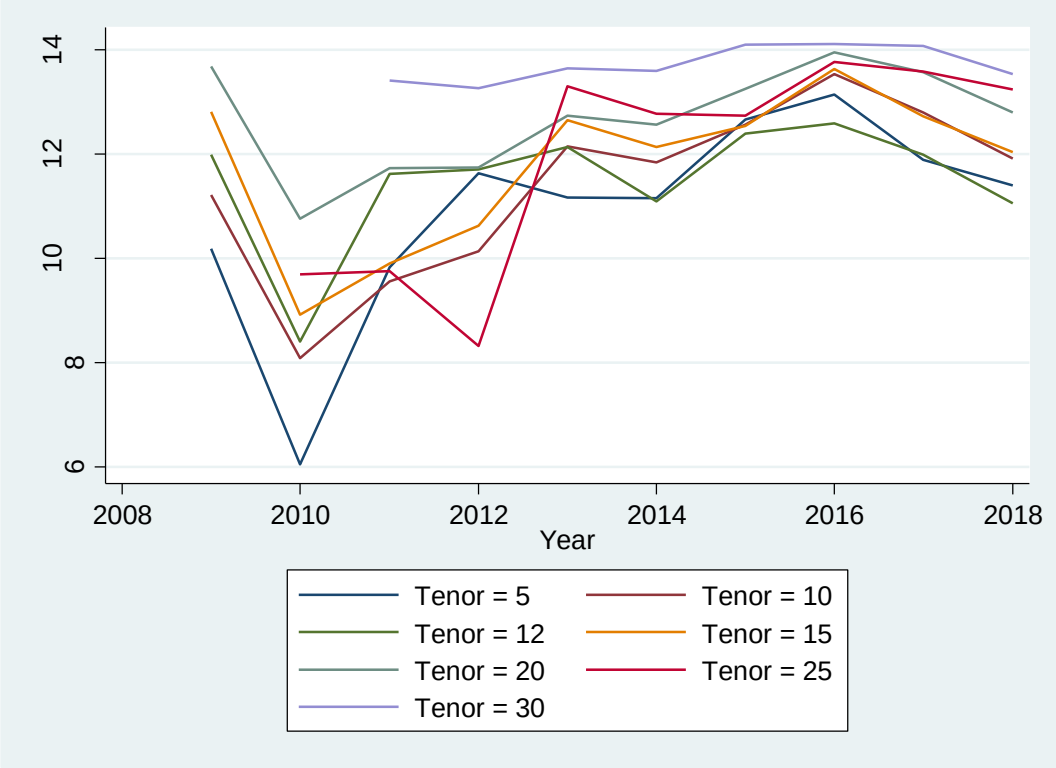

Figure 3: Bond Yields

Bond Liquidity and Bond Yields

The objective of the study was to determine the effect of bond liquidity on bond yields of treasury bonds in Kenya. The Breusch-Pagan Lagrange multiplier (LM) test was used to select between a random effects regression and a simple OLS regression. The null hypothesis in the LM test is that variances across entities is zero, that is, there is no significant difference across units (i.e. no panel effect). Results of hausman test indicated that a fixed effects model was appropriate. The objective informed the first hypothesis, which stated that there was no significant effect of bond liquidity on the bonds, yields of treasury bonds in Kenya.

H_{01}: There is significant Effect of Bond Liquidity on the Bond Yields of Treasury Bonds in Kenya.

Table 5 shows the fixed effect model analysis results undertaken to test the effect of bond liquidity on the bond yields of treasury bonds in Kenya. Similar studies adopted the same model to analyze variables (Christensen, Fischer & Shultz 2019; Weda, Namusonge & Oloko 2014; Fleming 2001; Beber, Brandt, Kavejecz 2009; Goyenko, Subrahmanyam & Ukhov 2008; and Nyongesa 2012).

Table 5. Fixed Effects model, Dependent variable:Bond Yields, predictor: Bond Liquidity

YTM	Coef.	Std. Err.	t	P>t
TR	-41.82***	1.44	-28.96	0.0000
_cons	27.73***	0.73	38.02	0.0000
Model Summary				
R-squared	0.083			
F(1,9254)	838.9			
Prob > F	0.0000			
Observations	9,262			
Number of Bond_ID	7			

*** p<0.01, ** p<0.05, * p<0.1

Where

YTM is Bond Yieds measured by Yield to maturity

TR is Bond liquidity measured by Turnover Rate

From the results tabled above, F-test statistic was statistically significant ($p<0.05$), which meant that the overall model was statistically significant, $F(1, 9254) = 838.9$, $p<0.05$. Based on the results of this study the relationship between bond liquidity and bond yields of treasury bonds in Kenya was negative and statistically significant ($\beta= -41.82$, $p<0.01$). It meant that for every unit increase in bond liquidity, there was a 41.82 unit decrease in bond yields of treasury bonds in Kenya. The t-test for bond liquidity (TR) was -28.96, and it was statistically significant, meaning that the regression coefficient for bond liquidity was significantly different from zero. R-squared (R^2) was 0.083 which suggested that bond liquidity accounted for 8.3% of the variance in bond yields (YTM) of treasury bonds in Kenya. Hypothesis one (H1) examined the relationship between bond yields (dependent variable) and bond liquidity of treasury bonds in Kenya by suggesting that There was no significant effect of bond liquidity on bond yields of treasury bonds in Kenya.

Results of this study indicated that bond liquidity (β= -41.82, p<0.01) was a significant predictor of bond yields. Bond liquidity accounted for 8.3% of the variance in bond yields of treasury bonds in Kenya. The H_0 was rejected and it was concluded that the bond liquidity affected the bond yields of treasury yields of treasury bonds in Kenya. The prediction equation $BY_{it}= \beta 0 + \beta 1\ BL_{it} + \varepsilon_{it}$ Where BY_{it} = Bond Yields, BL_{it} = Bond Liqudity and εit =Error term, the regression equation could be rewritten as output equation $BY_{it} = 27.73 - 41.82BL_{it} + \varepsilon_{it.}$

Results and Discussions

The objective of the study was to establish the effect of bond liquidity on bond yields of treasury bonds in Kenya. The null hypothesis formulated stated that there was no significant effect of bond liquidity on bond yields of treasury bonds in Kenya. The indicators for bond liquidity were turnover rate while the bond yields were operationalized by using the yield to maturity (YTM).The fixed effect model was used to analysis the hypothesis. Results of this study indicated that bond liquidity was a significant predictor of bond yields. Bond liquidity accounted for the variance in bond yields of treasury bonds in Kenya. Based on the results of this study the relationship between bond liquidity and bond yields of treasury bonds in Kenya was negative and statistically significant (β= -41.82, p<0.01). This means that for every unit increase in bond liquidity, there is a 41.82 unit decrease in bond yields of treasury bonds in Kenya. Bond liquidity accounted for 8.3% of the variance in bond yields (YTM) of treasury bonds in Kenya. The H_0 was rejected and it was concluded that the bond liquidity affected the bond yields of treasury yields of treasury bonds in Kenya.

The findings concured with the liquidity preference theory as postulated by Keynes (1936), which argue that traders prefer liquid and high interest rates on long-term bonds as compared to short-term securities that are illiquid. Further, liquidity was a crucial element in bond market growth that influenced bond yields as argued by (Vayanos, Dimitri & Jiang, 2012). In addition, (Christensen & Gillan, 2016) posit that traders demand high premiums for assets, which are illiquid. For such bonds government lose a lot of money as bond service costs.

Conclusions and Recommendations

The study concludes that bond liquidity has a statistically significant negative relationship with bond yields which is interpreted that every unit increase in bond liquidity, there is a 41.82 unit decrease in bond yields of treasury bonds in Kenya. Bond liquidity accounted for 8.3% of the variance in bond yields (YTM) of

treasury bonds in Kenya. The study adopted fixed effects models (FEM) to operationalize and test research hypothesis. Identification of relationship among variables will help securities exchanges and traders make decisions on how to build on the interactions between bond yields and market microstructure elements and provides better understanding of the behavior of yields in bonds markets. This study also supported the Liquidity preference theory as postulated by Keynes (1936) that argue that traders prefer liquid and high interest rates on long-term bonds as compared to short-term securities that are illiquid. This study was crucial to policy makers concerned with financial development in Kenya. It provided arguments on the operations at the securities exchange and soundness of secondary bonds market that could be used to design optimal regulatory framework. Evidence educed demonstrated relationship between the bond liquidity and bond yields in market. The study findings helped to balance divergent interests of investors and firms thus enhancing investor sentiment and integrity of the bonds market. It identified the bonds that acted as the price leaders at the different parts of the yield curve and determined factors driving yields over time.

The study recommend the central bank of Kenya to engage the Nairobi Securities exchanges and design good policies that would increase trading of treasury bonds at the secondary market. Public education on available opportunities at the securities exchange as far as available securities are concerned. Treasury bonds investments being safer investments, more emphasizes should be laid on the how Nairobi securities exchange should ensure efficiency in trading securities.

References

Acharya, V., V., & Pedersen, L., H. (2003). Asset Pricing with Liquidity Risk. Available at SSRN: https://ssrn.com/abstract=385907

Albright, S. C., Zape, W., & Winston, C. (2011). *Data Analysis and Decision Making*. 4th Edi. Cengage Learning.

Amihud, Y., & Mendelson, H. (1991). Liquidity, maturity, and the yields on U.S. Treasury securities. *Journal of Finance* 46, 1411-1425.

Amihud, Y., Mendelson, H., & Pedersen, L. H. (2005). Liquidity and Asset Prices, *Foundations and Trends in Finance* Vol. 1, No 4 (2005) 269-364.

Arfah, S., & Raya, M., & Hendrawan, A. (2021). The Moderating Role of Firm Size on the Association between Managerial Ability and Tax Avoidance. Journal ASET (Akuntansi Riset). 13. 39-049. 10.17509/jaset.v13i1.30783.

Balozi, S., & Njogo, M. (2017). Determinants of Kenyan government bond yields.

Beber, A., Brandt, M. W., & Kavajecz, K. A. (2009). Flight-to-Quality or Flight-to-Liquidity? Evidence from the Euro-Area Bond Market. *Review of Financial Studies*, 2009, vol. 22, issue 3, 925-957.

Brandt, M. K., & Kavajecz, A. (2004).U.S. treasury market: the impact of order flow and liquidity on the yield curve. *The journal of finance* vol. lix, no. 6

Chen, L., Lesmond, D. A., & Wei, J. (2007). Corporate Yield Spreads and Bond Liquidity. *Journal of Finance* 62, 119-149.

Christensen, J., H., E, Fischer, E., & Shultz, P. (2019). Bond Flows and Liquidity: Do Foreigners Matter? Federal Reserve Bank of San Francisco Working Paper 2019-08.

Codogno, L., Favero, C., & Missale, A. (2003). Government bond spreads. *Economic Policy* 18(37), 503-532.

Collins, B., Fabozzi, F. (2000). Equity Manager Selection and Performance. *Review of Quantitative Finance and Accounting* 15, 81–97

Cooper, D., R., & Schindler, P., S. (2006). *Business Research Methods*. McGraw-Hill Irwin,

Dick-Nielsen, Feldhutter, P., Lando, D.,(2012). Corporate bond liquidity before and after the onset of the subprime crisis. *Journal of Financial Economics*, vol. 103, issue 3, 471-492

Favero, C., Pagano, M., & Thadden, E. (2007). How Does Liquidity Affect Government Bond Yields? Working paper no. 181. - Centre for Studies in Economics and Finance – University of Salerno 84084 Fisciano (SA) – Italy

Fleming, M. J., (2001). Measuring Treasury Market Liquidity. FRB of New York Staff Report No. 133. Available at SSRN: https://ssrn.com/abstract=276289

Ghosh, S., & Revilla, E. (2007). Enhancing the Efficiency of Securities Markets in East Asia (February 1, 2007). World Bank Policy Research Working Paper No. 4129.

Goyenko, R., Subrahmanyam, A., & Ukhov, A. (2011). The term structure of bond market liquidity and its implications for expected bond returns. *Journal of Financial and Quantitative Analysis*, 46(1), 111-139.

Hicks, J. (1939). Value and capital: An inquiry into some fundamental principles of economic theory. Oxford: Clarendon Press. 1974

Keynes, J., M. (1936). The general theory of employment, interest and money. New York, Harcourt, Brace.

Koech, P. (2012). Relationship between liquidity and return of stock at the Nairobi securities exchange (Unpublished MBA Thesis). University of Nairobi, Nairobi.

Lartey, V., C. & Li1, Y. (2018). Daily frequency zero-coupon yield curve for government bonds traded on e-bond trading platform of the Ghana fixed income market. *International Journal of e-Education, e-Business, e-Management and e-Learning.*

Leogrande, A., Costantiello, A., Laureti, L. and Leogrande, D. (2021). The Determinants of Landscape and Cultural Heritage among Italian Regions in the Period 2004-2019. University Library of Munich, Munich.

Lutz, F. (1940). The structure of interest rates. *Quarterly Journal of Economics* 55: 36–63.

Nevitt, P., K. & Fabozzi F., J. (2000). Project Financing.

Ngugi, R., W., & Agoti J., (2010). Microstructure elements of the bonds market in Kenya. Nairobi: KIPPRA. Working paper series

Nwiado, D, & Deekor, L., N. (2013). The Domestic Bond Market and the Development of the Nigerian Capital Market: An Empirical Analysis. *Journal of Economics and Sustainable Development*

Nyongesa, N. W. (2012). Factors influencing the liquidity of secondary bond market in Kenya. Nairobi: KIPPRA. Working paper series

O'Hara, M. (1995). Market Microstructure Theory. Cambridge: Blackwell.

Sarr, A., & Lybek, T. (2002). Measuring Liquidity in Financial Markets. IMF Working Paper No. 02/232.

Thotho, L. (2017). Benchmark Bond Programme and Yield Curve Development in Kenya. An Accreditation Paper Submitted in Partial Fulfillment of the Award of MEFMI Fellowship.

Thupayagale P., (2015). Fixed Income Market Efficiency: Evidence from Kenya's 10-Year Local Currency Bond. *Botswana Journal of Economics, Volume 12, No 2 (2014).*

Vayanos D., & Jiang W. (2012) Liquidity and Asset Returns Under Asymmetric Information and Imperfect Competition. *Review of Financial Studies*, **25**, (5), 1339-1365

Weda, C. C., Namusonge, G. & Oloko, M. (2014). The Effect of government benchmark bonds to the liquidity of the bond market in Kenya. *International Journal of Research in Electronics and Communication Technology*