## EFFECT OF MARKET RESILIENCY LIQUIDITY DIMENSION ON INTEREST RATE RISK MANAGEMENT USING FINANCIAL **DERIVATIVES IN KENYA**

## Mary Zeresh Otsyula

College of Human Resource and Development, Jomo Kenyatta University of Agriculture and Technology P. O. Box 62000, 00200 Nairobi, Kenya **Corresponding Author email**: mzotsyula@gmail.com

## Dr. Florence. S Memba

College of Human Resource and Development, Jomo Kenyatta University of Agriculture and Technology P. O. Box 62000, 00200 Nairobi, Kenya

## Dr. Willy Muturi

College of Human Resource and Development, Jomo Kenyatta University of Agriculture and Technology P. O. Box 62000, 00200 Nairobi, Kenya

CITATION: Otsyula, M., Z., Memba, F., S., Muturi, W. (2017) Effect Of Market Resiliency Liquidity Dimension On Interest Rate Risk Management Using Financial Derivatives In Kenya. International Journal of Economics and *Finance*. Vol. 6 (6) pp 39 – 59.

#### **ABSTRACT**

Kenya, through the Vision 2030, is geared to become an international financial center and to achieve this goal deepening of the bond market provides opportunities for investment in Kenya to introduce new Trading Platforms. Ongoing roll out of Derivatives/Commodities Futures Exchange with the goal of providing more financial products to facilitate growth in the Kenyan economy is being undertaken by the Capital Markets . Whereas there are several trading platforms available for trading of financial derivatives aimed at managing interest rate risk, the effect of market resiliency dimension on the interest rate risk management using financial derivatives in Kenya and how electronic trading platforms affect them is not clear. The purpose of this study was to carry out empirical test on the effect of market resiliency liquidity dimension on the interest rate risk management using financial derivatives in Kenya. The study population included all the Commercial Banks licensed by the Central Bank of Kenya. Primary Data was collected using questionnaires. The study findings indicated market resilience significantly affects interest rate risk management using financial derivatives in Kenya. The study recommends that commercial bank dealers who are designed to provide clients services that require principal risk taking, a function which is a vital element of market resilience during volatile events, should adopt increased use of electronic trading platforms like Bloomberg and Citivelocity in providing core services to support the real economy. Such diversity is a necessary and welcome development, and complements the role commercial banks and bank dealers will continue to play in effective market functioning thus affecting market liquidity.

**Key Words:** Market Resiliency Liquidity Dimension, Interest rate risk, financial derivatives, Commercial Banks, Kenya

## **Background of the study**

Increased globalization, according to Zekos, (2005) affects economies through various ways. These include expanded trade in services and merchandise, licensing of product and technology, foreign direct investment, and general greater international investment portfolio. In the past, financial institutions mainly relied on "Traditional Risk Management" as a way of managing their risk (Barton, Shenkir & Walker, 2002). However, this approach has a limited scope, which Hoyt et al, (2008) explains that has given room for the full exploitation of new trading platform technology. For instance, the "Traditional Risk Management" conception lacks total integration that is most critical for many financial institutions. In the Middle East and Northern Africa regions, trading platforms are less developed as compared to other developed countries in the world. In essence, the first-mover effect is likely to have greater influence in these countries compared to trading platform choices, such as electronic trading and open outcry trading, in terms of determining how successful equivalent product introductions can turn out to be. Basing on the above explanation, Al Janabi (2008) argues that new derivative exchanges using electronic trading platforms, and which offer competing versions to the existing derivative contracts are likely to face difficulties in succeeding.

According to Kamau et al (2013), Kenyan Commercial banks operate in an environment that makes it difficult for them to hedge against interest rate risk, especially owing to the variations in the foreign exchange rates. Additionally, an increase in the average domestic rates as compared to the foreign interest rates as well as rise in foreign price result in appreciated exchange rate (Kamau et al (2013). The inefficiency in the money market makes it difficult for the banks to evaluate and predict correctly their impending risks. Dhanani, (2007) asserts that Interest rate risk (IRR) represents one of the key forms of financial risk that companies encounter. In recent years, the management of IRR has gained prominence in the corporate sector for several primary reasons. First, interest rate volatility increased considerably in recent years. Second, there has been a dramatic increase in the use of corporate debt in companies with firms financing

more of their funding requirements through shorter-term borrowings rather than equity.

## Statement of the problem

Whereas there are several trading platforms available the trading of financial derivatives aimed at managing interest rate risk, it is not clear how these platforms affect the quality of the markets in which these derivatives are traded. It is not clear how they affect the immediacy, depth, breadth and resiliency of these markets. According to the Bi-Annual Report prepared by the members of the Monetary Policy Committee of the Central Bank of Kenya (2012) the rise in short term interest rates due to tight liquidity conditions were transmitted to the commercial banks interest rates. The average commercial banks' lending rates increased from 15.21 percent in October 2011 to 20.34 percent in March 2012 before dropping slightly to 20.22 percent in April 2012. Commercial Banks in the bond market are exposed to market risk (Association Cambiste Internationale Singapore, 2010). Use of derivatives in the Treasury bond market in emerging markets is not clear. In Kenya the risks in the bond market are on the rise as evidenced by the decrease in the profit of the banks. This is due to sharp increase in interest rates which resulted in the revaluation of the trading book thereby causing mark-to-market unrealized losses in the bond trading portfolio and derivatives (Standard Chartered Bank, 2011; National Bank of Kenya, 2011).

Empirical studies find lapses in the use of derivatives to hedge interest rate risk across the world. Dhanani et al (2010) examined the interest rate risk management practices of UK companies. In particular, the study examined five theories that have been advanced in the literature to explain why companies hedge: tax and regulatory arbitrage; under-investment, volatility of earnings and future planning; financial distress; managerial self-interest; and economies of scale. The research findings confirmed that all five theories of financial risk management have some support in practice.

Ameer (2010) documents Determinants of Corporate Hedging Practices in Malaysia and found out that only a few listed Malaysian firms have appropriate understanding of the derivatives instruments to mitigate risks. Ngugi et al (2013) points out to the Factors influencing development of financial derivatives markets in Kenya. Okumu (2013) conducted a research on impact of microstructure changes on market efficiency at the Nairobi Securities Exchange focusing on market efficiency before and after market automation ,While these studies address broadly the prevalence of use of derivatives and the impact of market microstructure in the world there exists a gap on the existing literature specifically focusing on the Effectiveness of Electronic Trading Platforms in the Interest Rate Risk management using Financial Derivatives in Kenya.

According to An outlook of Capital Markets in Kenya (2012/2013) Kenya, through the Vision 2030, is geared to become an international financial center and to achieve this goal deepening of the bond market provides opportunities for investment in Kenya to introduce new Trading Platforms. Whereas there are several trading platforms available for trading of financial derivatives aimed at managing interest rate risk, The Effect of Electronic Trading Platforms in the Interest Rate Risk management using Financial Derivatives in Kenya and how market immediacy, depth, breadth and resilience affect the financial derivatives markets they operate in is not clear.

# **Specific objectives**

- 1.To establish the effect of market resiliency liquidity dimension on the Interest Rate risk management using Financial Derivatives in Kenya.
- 2.To investigate the moderating effect of Electronic trading platforms on the relationship between market resiliency liquidity dimension and the use of financial derivatives in interest rate risk management.

## **Research Hypotheses**

- 1.**H**<sub>01</sub>: There is no significant effect market resiliency on the Interest Rate risk management using Financial Derivatives in Kenya.
- 2.**H**<sub>02</sub>: Electronic trading platforms do not moderate the relationship between market resiliency liquidity dimensions and the use of financial derivatives in interest rate risk management

#### **Theoretical Literature Review**

## Information based model (Copeland and Galai, 1983)

The model has an important role for information concerning the development of the bid/ask spread. This model of Copeland & Galai (1983) is based on the concept of information costs and it analyzes the price setting problem of the market maker of one period of time that is dealing with informed traders and uninformed traders. This model reveals the bid/ask spread in a monopoly situation for the market maker and in a competitive markets situation.

This model of Copland & Galai (1983) is used in asymmetric of information and generally is based on the concept of information costs and it analyzes the price setting problem of the market maker (dealer) of one period of time that is dealing with informed traders and uninformed traders. Copland & Galai (1983) as well as Glosten & Milgrom (1985)show that, even if inventory and order processing costs are neglected, the resulting bid-ask spread should be positive due to information costs. Pre trade information is an indicator of market resiliency, increase in pre trade transparency for buy side markets participants normally price takers in over the counter derivatives market improves price detection procedure and reduces information asymmetry.

## **Agency theory**

The Agency Theory traces its origin back to 1976, following initial study works on structure and ownership by Jensen and Meckling (Walkling, 2011). Corporate decisions are made by managers on behalf of principals. The agency problem arises when agents' interests are not aligned with principals' interests. Conflicts between managers and shareholders can arise on issues such as firm value, investment decisions and compensation contracts (Jensen and Meckling, 1976; Jensen and Smith, 1985).

Agency theory has been used to analyze the twin notion of managerial self-interest and managerial risk aversion by Dhanani et al (2007); who pointed out that the labor market revises its opinions about managers' ability based on the performance of the company where they work. By using derivatives to hedge interest rate risk, executives can smooth the earnings of the company and influence the labor market's perception of their talents. Managers (agents) decide upon hedging policy rather than shareholders (principals) and hedge to maximize their expected lifetime utility by reducing the possibility that they

might be compelled to leave the firm, and are likely to try and take advantage of the difference in their expectations differ from the market or where they believe that they can take advantage of market trends (Dhanani et al, 2007).

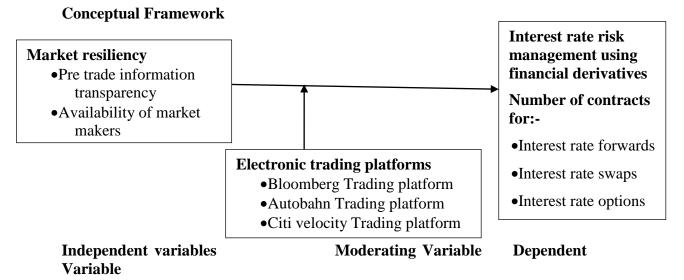


Figure 1: Conceptual Framework

## Market resiliency

Market resiliency reflects how quickly the liquidity supply is replenished and the price moves back to equilibrium after a large uninformed liquidity demand has been filled (International Monetary Fund, 2015). Resiliency is a function of liquidity suppliers ("makers") monitoring intensity, the fee structure at the trading venue and the fraction of liquidity suppliers (International Monetary Fund, 2015). Market resilience as a whole refers to a vital functioning of the economy that provides essential services needed by borrowers and savers (Adam, 2009). Financial institutions equally rely on market resilience as a mechanism of intermediating credit to both households and companies.

Achieving market resilience especially when the economy is facing increased volatility in price and a deteriorating liquidity condition, the market practices need to promote transparency (Johnson, 2009). Furthermore, the legal strength of trades, efficient and reliable information provision regarding risk-management systems, and the proficient management of counterparty credit risks need to be prioritized (Kavussanos, Visvikis&Goulielmou, 2007).

## **Electronic trading platforms**

An electronic trading platform (ETP) is a subset of an electronic trading system. An electronic trading system is a facility which provides some or all of the following services: order routing (from computer to computer); order execution ("click-and-trade"); credit risk management (central counterparty trading);

automated trade settlement (straight-through processing); and dissemination of pre-trade and post-trade information (Gemloc Advisory Services, 2013).

ETP is an electronic trading system which provides a matching engine to pair buyers and sellers as a computer ranks orders by price levels and timing of inputs, which further facilitates trading between multiple parties. When orders are matched, the execution of a trade can either require a manual intervention (click and trade) or be automatic (cross-matching) (Gemloc Advisory Services, 2013). In any case, an ETP requires a market regulation, detailing who can access the ETP, which instruments can be traded, the trading rules and the supervision of the market. An ETP is often referred to as a multilateral trading facility (MTF). ETPs are generally self-regulated organizations (Gemloc Advisory Services, 2013)

## Interest rate financial derivatives

According to Amattamsir (2011) & Association Cambiste Internationale Singapore, 2010, 2010 derivatives used interest rate derivatives are SWAP, forwads and options. An interest rate swap (IRS) is an instrument that allows a counter party to exchange one set of cash flows for another for example from floating to fixed. Their exposures to interest rates fluctuate in opposite directions. Loeys (Humphrey, 2011; Association Cambiste Internationale Singapore, 2010). A forward rate agreement (FRA) is an off balance sheet instrument to fix future borrowing or lending rates. It does this through a cash settlement in the future. An FRA is an agreement to pay or receive on an agreed future date the difference between an agreed interest rate and the interest rate prevailing on that future date based on an agreed notional principal amount (Amattamsir, 2011).

An option contract is defined as "an agreement between two parties in which one party, the writer, grants the other party, the purchaser, the right, but not the obligation, to either buy or sell a given security, asset, or commodity at a future date under stated conditions" Poitras (Amattamsir, 2011). An important note is that an option contract confers the owner a right to enforce the contract because it is most often subjected to an upfront payment, a premium. The maximum loss of this contract is that of the premium while the potential gain is limitless. Interest Rate Options are options of which the payoffs depend on the level of the interest rates and are traded in the over-the-counter market.

#### **Research Methodology**

Saunders (Muturi, 2012) postulates that combining different designs in one study enable triangulation and increases the validity of the findings. For this reason, two types of research design were used in this study. First, descriptive design was used to establish the cause and effect relationship between the independent variable (market resiliency dimension) and the dependent variable (Interest rate risk management using financial derivatives). Second, since descriptive designs do not signify causation relationships, a cause-effect design was used to determine in a more rigorous way the effect of market liquidity dimensions on the interest rate risk management using financial derivatives in Kenya. The population comprised of all the forty two banks registered by the Central Bank of Kenya. The study conducted a census of all the forty two banks licensed by Central Bank of Kenya as at the year 2016 instead of adopting a sampling methodology. This was justified on the basis that the number of banks are few. Three commercial banks were not eligible for inclusion in the study as they were under statutory management. The study targeted

three respondents from each commercial bank namely the treasurer, senior dealer and dealers. The study adopted a semi structured questionnaire as the main instrument for collecting primary data. A semi structured questionnaire utilized both open and closed ended questions structured in accordance with the conceptual framework and empirical literature. The study analyzed the data using descriptive analysis entailing frequencies, mean and standard deviation. Inferential techniques involved the use of correlations and regression analysis. A linear regression model was used to test the significance of the effect of market resiliency dimension on the interest rate risk management using financial derivatives in Kenya.  $Y = \alpha + \beta_1 X_1$ 

#### Where:

Y = Interest rate risk management using financial derivatives

X<sub>1</sub>= Market resiliency Liquidity Dimension

e=Error term and  $\alpha$ = constant

 $\beta$ =coefficient of independent variables

In testing for the moderating effect of electronic trading platform, the study adopted the Moderated Multiple Regression (MMR) analysis. The main effects of the predictor (X) and the hypothesized moderator (Z) are estimated using regression.

$$Y = \beta_0 + \beta_1 X_1.Z + \mu$$

Y = Interest rate risk management using financial derivatives

 $X_1$  = Market resiliency Liquidity Dimension

Z = Moderating variable (Electronic trading platform)

e=Error term and  $\alpha$ = constant

 $\beta$ =coefficient of independent variables

Prior to running the regressions, diagnostic tests were conducted to ensure the assumptions of classical linear regression were not violated. The normality of the dependent variable was established using one-sample Kolmogorov-Smirnov Test (KS).

## **Research Findings and Discussion**

The number of questionnaires that were administered was 117 out of which 108 were filled and returned indicating an overall successful response rate of 92.3%. They fit with the argument of Kothari (2004) that a response rate of 50% or more is adequate for a descriptive study. The high response rate was facilitated by a personal introduction letter, an introduction letter obtained from Jomo Kenyatta University and persistent follow up by the researcher through reminder emails and phone calls.

#### **Results of Pilot Test**

The study conducted a pilot test to test for the instrument reliability. The participants in the pilot test were not included in the final study. The reliability of an instrument refers to its ability to produce consistent and stable measurements. Reliability of this instrument was evaluated through Cronbach Alpha which measures the internal consistency. Cronbach Alpha value is widely used to verify the reliability of the construct. The results are presented in Table 1.

**Table 1 Reliability Coefficient** 

Variables		Cronbach's Alpha	Comment
Market resiliency Dimesnion	Liquidity	0.705	Accepted
Bloomberg		0.984	Accepted
Autobahn		0.995	Accepted
Citi-velocity		0.905	Accepted
Financial derivatives		0.919	Accepted

The findings in Table 1 indicate that the variables had Cronbach's value above the set alpha coefficients cutoff point of 0.7 hence all the study variables were adopted. This represented high level of reliability and on this basis it was supposed that scales used in this study was reliable to capture the variables. Nunnally's (as cited by Ongore,2008) suggestion is that a value of not less than 0.7 is acceptable. This study adopted a threshold of 0.7 and based on this, the instrument was reliable.

#### **Demographic Characteristics**

## Years of experience

The respondents were asked to indicate the period they had worked for the commercial banks. The results are as presented in Figure 1.

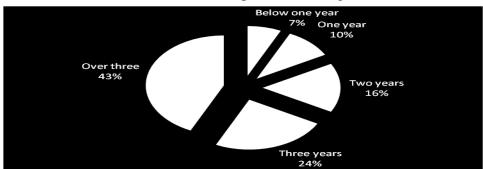


Figure 1: Years of experience

Results in Figure 1 reveal that 33% of the respondents had worked for the commercial banks for a period of 2 years or less, 24% had worked for a period of three years and those who had worked for over three years were 43%. This implies that the rate of turnover in the banking sector in Kenya is low. The findings also imply that the respondents had more experience and information and were eligible to respond to the questionnaires. This improved the reliability of the information given. These findings agree with the findings of a study by Bunderson & Sutcliffe (2002) that as people gain more experience in an industry, the rate of turnover decreases.

#### **Age of Respondents**

The respondents were also asked to indicate their age. The results are presented in Figure 2.

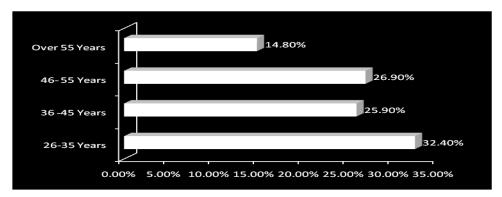


Figure 2: Age bracket of the Respondents

Results in Figure 2 reveal that 14.8% of the respondents were over 50 years, 26.9% were between 46 and 55 years while those who were between 36 and 45 years were 25.9%. Majority of the respondents, 32.4%, were between 26 and 35 years. This implies that majority of the dealers; treasurers and senior dealers are aged between 26 and 35 years.

## Academic qualification

The respondents were asked to indicate their level of education. The results are presented in Figure 3.

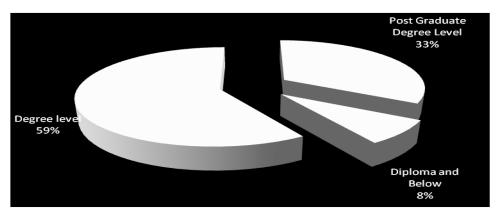


Figure 3: Academic qualification

Results in Figure 3 reveal that only 8% of the respondents had education up to the diploma level, 33 % indicated that they had a post graduate level of education while majority, 59% of the respondents indicated that they had attained a degree level of education. This implies that dealers, senior dealers and treasurers at commercial banks in Kenya are educated. It also implies that majority of the respondents (59%) had university qualification, and a few others had diploma level of education as well as post graduate degree. The education level can also be linked to high information regarding the financial derivatives markets as indicated by a high reliability of the pilot results. The findings agree with the findings of researchers (Kinuu et al, 2012; Kasomi, 2015) who have linked high educational attainment with greater knowledge and skills as well as the findings of a study by Carpenter and Fredrickson (2013) who noted that one of the sociocognitive capacities related to educational level is greater information-processing abilities.

# **Market Resiliency Liquidity Dimension**

The respondents were also requested to indicate their level of agreement or disagreement with statement concerning market resiliency Liquidity Dimension. The results are as presented in Table 2.

**Table 2 Descriptive results for Market resiliency Liquidity Dimension** 

Statement							Std
	1	2	3	4	5	Mean	Dev
Market							
participants':							
Access							
published quotes							
and orders for							
interest rate							
forwards.		40.80					
	4.30%	%	24.70%	10.00%	20.20%	2.67	1.25
Access							
published quotes							
and orders for							
interest rate							
swaps.							
	8.60%	6.90%	18.30%	20.00%	46.20%	4.00	0.23
There is							
presence of							
buyers and							
sellers of interest							
rate swaps in the		10.00					
market.	- <b>-</b> 0	10.80	<b>2</b> - <b>2</b> 0	4.4.00	22 1221		o
	6.50%	%	36.50%	14.00%	32.40%	3.33	0.47
Market							
participants'							
access published							
quotes and							
orders for							
interest rate	10.00						
options	10.80	0.200/	1.4.700/	26 100/	20.100/	4.00	0.22
There is	%	8.30%	14.70%	36.10%	30.10%	4.00	0.22
presence of buyers and							
sellers of interest							
rate options in	10.80						
the market.	%	2.20%	46.90%	24.10%	16.10%	3.00	0.68
mo market.	/0	2.2070	10.7070	21.10/0	10.1070	5.00	0.00
Average						3.40	0.57

The study findings indicated that the respondents neither agreed nor disagreed with the statement that market participants' access published quotes and orders for interest rate forwards but agreed that market participants' access published quotes and orders for interest rate swaps. They also agreed that market

participants' access published quotes and orders for interest rate options. Majority of the respondents neither agreed nor disagreed that there is presence of buyers and sellers of interest rate options in the market.

# **Electronic trading platforms**

The study sought to establish the moderating effect of Electronic trading platforms on the relationship between market resiliency dimensions and the use of financial derivatives in interest rate risk management. The electronic trading platforms adopted for the study were Bloomberg, citi-velocity and Autobahn. The descriptive results for each electronic trading platform were established. The findings indicated that on average, the respondents neither agreed nor disagreed with statements concerning Bloomberg as shown by the overall mean. The respondents neither agreed nor disagreed that Bloomberg Platform has many liquidity providers for interest rate forwards, swaps and options as well as eligible liquidity takers for interest rate forwards, swaps and options.

Table 4.3 Descriptive results for Bloomberg

Statement						Mea	Std
Bloomberg has:	1	2	3 4	5		n	Devi
Many liquidity providers for interest rate forwards.	6.5%	22.2%	24.70%	16.1 %	30.50 %	3.00	0.82
Many eligible liquidity takers for interest rate forwards.	2.2%	4.3%	44.30%	24.7 %	24.50 %	3.00	0.82
Huge transactions on interest rate forwards	6.8%	8.9%	44.0%	24.2 %	16.10 %	3.00	0.82
The approximate number of interest rate forwards per is more than 10 in number.	4.3%	22.9%	26.50%	12.3	24.10 %	3.33	0.47
Many liquidity providers for interest rate swaps.	20.00	6.50%	32.20%	15.50 %	25.90 %	3.00	0.82
Many eligible liquidity takers for interest rate swaps.	8.60%	40.00%	16.50%	14.70 %	20.20	3.00	0.82
Huge transactions on interest rate swaps product are	5.40% 5.40%	18.60% 10.00%	35.40% 31.50%	13.30 % 15.80	27.30 % 17.30	3.33	0.47

Statement						Mea	Std
Bloomberg has:	1	2	3 4	5		n	Devi
The approximate number of interest rate swaps per is more than 10 in number.				%	%	3.33	0.47
Many liquidity providers for interest rate options.	5.40%	3.20%	45.40%	11.60 %	34.40 %	2.67	1.25
Many eligible liquidity takers for interest rate options.	11.80 %	22.80%	31.50%	21.0 %	12.90 %	2.67	1.25
Huge transactions on interest rate options product are	3.20%	44.30%	21.50%	8.60 %	12.40 %	2.67	1.25
The approximate number of interest rate options per is more than 10 in number.	30.40 %	10.40%	40.00%	9.10 %	10.00	2.67	1.25
Average						2.9 7	0.8 8

The respondents also neither agreed nor disagreed that huge transaction on interest rate forwards, swaps or options product are done on Bloomberg Platform. Furthermore, majority of the respondents neither agreed nor disagreed that the approximate number of interest rate forwards, swaps and options per day on Bloomberg trading platform is more than 10 in number. The respondents were further requested to indicate their level of agreement or disagreement with statements concerning citi-velocity as an electronic trading platform. The results are as presented in Table 4.

The findings showed that on average, the respondents agreed on statements concerning citi-velocity. Majority of the respondents agreed that Citivelocity Platform has many eligible liquidity takers for interest rate forwards, options and swaps. The respondents also agreed that huge transactions on interest rate forwards and swaps product is done on Citivelocity Platform. The approximate number of interest rate forwards and swaps per day on Citivelocity trading platform is more than 10 in number. Concerning interest rate options, majority of the respondents disagreed that huge transactions on interest rate options product are done on Citivelocity Platform.

**Table 4 Descriptive results for Citi-velocity** 

Statement Citivelocity Platform has:-	1	2	3	4	5	Mean	Std Dev
Many liquidity providers for interest rate forwards.	23.7%	15.8%	26.3%	15.8%	18.4%	3.00	1.64
Many eligible liquidity takers for interest rate forwards.	6.3%	13.7%	14.2%	35.3%	30.5%	4.00	0.82
Huge transactions on interest rate forwards	8.9%	8.4%	13.7%	35.3%	33.7%	4.00	0.82
The approximately more than 10 interest rate forwards per.	10.5%	6.3%	8.4%	38.9%	35.8%	4.00	0.82
Many liquidity providers for interest rate swaps.	9.5%	15.8%	11.6%	35.3%	27.9%	4.00	0.82
Many eligible liquidity takers for interest rate swaps.	11.1%	8.9%	11.1%	38.4%	30.5%	4.00	0.82
Huge transactions on interest rate swaps product The approximately more than	6.3%	13.7%	13.7%	27.9%	38.4%	4.00	0.82
10 interest rate swaps	6.3%	13.7%	14.2%	35.3%	30.5%	4.00	0.82
Many liquidity providers for interest rate options.	12.1%	14.2%	51.1%	20.0%	2.6%	3.33	0.47
Many eligible liquidity takers for interest rate options.	2.1%	6.3%	48.9%	20.0%	22.6%	3.67	0.47
Huge transactions on interest rate options	13.7%	8.9%	24.2%	25.3%	27.9%	3.33	0.47
The approximately more than 10 interest rate options	39.5%	2.6%	23.7%	5.3%	28.9%	3.33	0.47
Average						3.72	0.77

Lastly, the respondents were requested to indicate their level of agreement or disagreement with statements concerning Autobahn as an electronic trading platform. The results are as presented in Table 5.

**Table 5 Descriptive results for Autobahn** 

Statement Autobahn Platform							G4 1
has:	1	2	3	4	5	Mean	Std Dev
Many liquidity providers for interest rate forwards.  Many eligible liquidity takers for	10.4 %	13.2%	-		31.7%	4.00	0.72
interest rate forwards.	14.7 %	18.9 %	53.7%	10.0%	2.6%	3.00	0.82

Statement						
Autobahn Platform						G. I
has:	2	3	4	_	Maan	Std
	16.2	3	4	5	Mean	Dev
Huge transactions on interest rate forwards 2.1%	16.3 %	16 20/	22.60/	12 60/	1 11	0.60
	%0	16.3%	22.6%	42.6%	4.44	0.60
The approximate number of interest						
rate forwards per day is more than 10 in 18.4	13.2					
number. %	%	28.9%	15.8%	23.7%	3.68	1.12
Autobahn Platform	%0	28.9%	13.0%	23.1%	3.08	1.12
has many liquidity providers for interest	18.9					
-	%	13.7%	20.0%	42.6%	4.00	0.82
rate swaps. 4.7% many eligible	70	13.770	20.070	42.0%	4.00	0.82
liquidity takers for						
<u> </u>	6.3%	16.3%	32.6%	42.6%	4.00	1.22
Huge transactions on 18.4	13.2	10.570	32.070	42.070	4.00	1.22
interest rate swaps %	%	38.9%	15.8%	13.7%	3.32	0.82
The approximate	70	30.770	13.070	13.770	3.34	0.62
number of interest						
rate swaps per day is						
more than 10 in						
	9.5%	16.3%	35.3%	30.0%	4.12	0.46
Autobahn Platform	7.5 /0	10.570	33.370	30.070	7.12	0.40
has many liquidity						
providers for interest						
1	11.6%	40.5%	13.2%	27.9%	3.89	0.82
Many eligible	11.070	TO.5 /0	13.270	21.770	3.07	0.02
liquidity takers for						
± •	6.8%	23.2%	30.5%	30.5%	4.00	0.78
Huge transactions on 13.6	28.9	23.270	30.370	50.570	1.00	0.70
interest rate options %	%	25.8%	15.8%	15.8%	3.67	0.47
The approximate	70	20.070	10.070	10.070	2.07	0.17
number of interest						
rate options is more						
than 10 in number. 6.8%	20.6%	30.5%	13.2%	18.9%	3.66	0.44
Average					3.81	0.76

# Financial Derivatives Used To Manage Interest Rate Risk

The dependent variable of the study was financial derivatives used to manage interest rate risk. The respondents were requested to rate statements on financial derivatives used to manage interest rate risk on a scale of 1 to 5. The descriptive results are presented in Table 6.

Table 6 Descriptive results of Financial Derivatives Used to Manage Interest Rate Risk

							Std
Statement	1	2	3	4	5	Mean	Dev
The bank uses financial							
derivatives to:							
Swap from fixed rate to floating		41					
rate debt	9%	%	21%	8%	21%	2.33	1.25
swap from floating rate to fixed	14	40					
rate debt	%	%	20%	13%	13%	2.33	1.25
Fix in advance the rate (spread)		38					
on new debt	3%	%	32%	13%	14%	3.00	1.42
The bank uses interest rate							
options that							
: Are exercised only on the	28	38					
expiry date	%	%	11%	8%	15%	2.00	1.42
The purchaser has the right to							
exercise the option at any time							
before and on the expiry date of	40	30					
the contract.	%	%	4%	13%	13%	1.00	0.12
Specified dates for the duration	18	46					
of the contract.	%	%	3%	11%	12%	2.00	1.42
Average						2.11	1.13

The findings indicated that the respondents disagreed with most of the statements regarding interest rate risk management using financial derivatives as indicated by an overall mean of 2.11. Majority of the respondents disagreed that the bank uses financial derivatives to Swap from fixed rate to floating rate debt, swap from floating rate to fixed rate debt, the bank uses financial derivatives to Fix in advance the rate (spread) on new debt, the bank uses interest rate options that are exercised only on the expiry date of the and that the bank uses interest rate options that the purchaser has the right to exercise the option at any time before and on the expiry date of the contract. Majority of the respondents further disagreed that the bank uses interest rate options that are exercised only on the pre-specified dates for the duration of the contract.

## **Normality Test**

The normality of the dependent variable was tested using Kolmogorov Smirnova test to show whether there was presence of extreme values. The dependent variable should be normally distributed. The results for the KS test of normality are as presented in Table 7.

Table 7 Kolmogorov-Smirnova test of normality

Tests of Normality									
			Kolmogorov-Smirnova			Shapiro-Wilk			
			Statistic	df	Sig.	Statistic	df	Sig.	
Interest	rate	risk							
managem	ent	using	0.272	108	0.056	0.765	108	0.056	

financial derivatives

a Lilliefors Significance Correction

The null hypothesis that the dependent variable is normally distributed is not rejected at 5% level of significance since the level of significance that is, 0.056 for KS test in (Table 7) is not significant (more than 0.05). This implies that the data met the statistical requirements to be used in a regression model.

## **Correlation Analysis**

A correlation was used to establish the association between market resiliency dimension and interest rate risk management using financial derivatives.

**Table 8 Correlation Results** 

			Interest rate risk
		Market	management using financial
Correlations		resiliency	derivatives
	Pearson		
Market resiliency	Correlatio		
Liquidity Dimension	n	1	
	Sig. (2-		
	tailed)		
Interest rate risk	Pearson		
management using	Correlatio		
financial derivatives	n	.546**	1
	Sig. (2-		
	tailed)	0.000	
** Correlation is significant	nt at the 0.01	level (2-taile	d).

The study findings indicated that market resiliency liquidity dimension and interest rate risk management using financial derivatives were positively and significantly correlated (R=0.546, Sig = 0.000) at 1% level of significance. This implies that an improvement in the indicators of market resiliency liquidity dimension positively leads to an increase in interest rate risk management using financial derivatives.

#### **Regression Analysis**

The study sought to assess the effect of market resiliency on the interest rate risk management using Financial Derivatives in Kenya. The study sought to establish the effect of each of the two indicators of market resiliency on Interest Rate risk management using Financial Derivatives in Kenya. This was done in order to establish the indicator which significantly affects Interest Rate risk management using Financial Derivatives. The two indicators were Pre trade information transparency and availability of market makers.

A multivariate regression model between the two indicators and the dependent variable was established. The results for model summary are presented in Table 9. The findings indicated that the two indicators of market resiliency that is pre trade information transparency and availability of market makers jointly explain up to 28.0 % of the changes in interest rate risk management using financial derivatives as indicated by a coefficient of determination of 0.28.

Table 9 Market resiliency indicators and Use of Financial derivatives (Model summary)

Mod	lel Summary				
Mod	le		Adjusted	R	
1	R	R Square	Square		Std. Error of the Estimate
1	.520	0.280	0.271		0.72148

The overall relationship between market resiliency and the Interest Rate risk management using Financial Derivatives in Kenya was also established using an ordinary least square regression model. The results for the model summary are as presented in Table 10.

Table 10 Regression model summary (Market resiliency)

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate					
1	.655a	0.429	0.423	0.793052					
a Predictors: (Constant), Market resiliency									

The results indicate that market resiliency accounts for up to 42.9% of the changes in interest rate risk management using financial derivates by commercial banks in Kenya as indicated by a coefficient of determination value of 0.429. The overall model linking indicators of market resiliency to interest rate risk management using financial derivatives was also significant in explaining the influence of market resiliency on interest rate risk management using financial derivatives (Significance of F-statistic = 0.000). The results are shown in Table 11.

Table 11 Market resiliency indicators and Use of Financial derivatives (Model Fitness)

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	29.167	2	29.167	35.333	.000
	Residual	87.5	105	0.825		
	Total	116.667	107			

The overall model significance of the model linking market resiliency to interest rate risk management using financial derivatives shown in Table 11 findings indicated that the model linking market resiliency to interest rate risk management using financial derivatives was significant as indicated by a significance value of 0.000 which is less than 0.05 at 5% level of significance. This implies that the model was significant in predicting interest rate risk management using financial derivatives.

**Table 12 Regression model Significance (Market resiliency)** 

ANOVA						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	50	1	50	79.5	.000
	Residual	66.667	106	0.629		
	Total	116.667	107			

a Dependent Variable: Financial derivatives b Predictors: (Constant), Market resiliency The study findings also indicated that pre trade information transparency have a positive and significant influence on interest rate risk management using financial derivatives (Beta = 0.682, Sig = 0.000). Results of the study are in line with the results of a study by Monetary Authority of Singapore (2016); International Monetary Fund (2015) that pre trade information transparency generally improves price discovery process and reduces information asymmetry.

The study findings also indicated that availability of market makers have a positive and significant influence on interest rate risk management using financial derivatives (Beta = 3.846, Sig = 0.000). These findings confirms the conclusion by European Systemic Risk Board (2016);Bank of England (2011) that a key element of market liquidity is market makers ability to absorb temporary order imbalance by warehousing risk for short periods of time ,market makers may finance positions through repo markets providing a connection between market liquidity and funding liquidity.

Table 13 Market resiliency indicators and Use of Financial derivatives (Model Coefficients)

Independent variable	В	Std. Error	t	Sig.
(Constant)	0.213	0.456	0.812	0.317
Availability of market makers	3.846	0.382	22.118	0.000
Pre trade information transparency	0.682	0.232	6.728	0.000

# Interest risk management using Financial derivatives = 0.213 + 3.846 (Availability of market makers) + 0.682 (Pre trade information transparency)

The results indicate that the two indicators of market resiliency had a significant influence on the dependent variable. The influence of availability of market makers was greater (Beta = 3.846) than the influence of pre trade information transparency (Beta = 0.682). The regression model coefficients of the model linking market resiliency to interest rate risk management using financial derivatives as presented in Table 14 showed that market resiliency has a positive and significant influence on interest rate risk management using financial derivatives (Beta = 2.083, Sig = 0.000).

Table 14 Regression model coefficients (Market resiliency)

			Std.		
Model		В	Error	T	Sig.
1	(Constant)	-4.972	0.798	-6.23	0.000
	Market resiliency	2.083	0.234	8.916	0.000

a Dependent Variable: Dependent Variable: Interest rate risk management using financial derivatives

Interest rate risk management using financial derivatives = -4.972 + 2.083 Market resiliency

## **Moderating effect of Electronic trading platforms**

The study sought to establish the moderating effect of Electronic trading platforms on the relationship between market resiliency dimension and the use of financial derivatives in interest rate risk management.

$$Y = \beta_0 + \beta_1 X_1.Z + \mu$$

Where, Y = Interest rate risk management using financial derivatives,  $X_1$  = Market resiliency, Z = Moderating variable (Electronic trading platform), e= Error term and  $\alpha$ = constant,  $\beta$ =coefficient of independent variable. The findings indicated that electronic trading platform significantly moderates the relationship between market resiliency and interest rate risk management using financial derivatives (Sig = 0.000 < 0.05).

Table 15 Multiple regression model summary after moderation

		Std.		
<b>Predictor Variable</b>	В	Error	t	Sig.
(Constant)	5.645	0.271	20.854	0.000
Resiliency interaction	0.186	0.039	4.775	0.000
Dependent Variable:	Interest rate	risk mana	gement usin	g Financial
derivatives			_	_

#### **Conclusion**

Based on the findings the study concluded that market resiliency has a significant effect on interest rate risk management using financial Derivatives by Commercial Banks in Kenya .The indicators of the market resilience that is market participants' access to published quotes and orders and availability of market markers positively leads to an increase in interest rate risk management using financial derivatives. The study findings led to the conclusion that electronic trading platforms that is; Bloomberg, Citivelocity and Autobahn Platform has many liquidity providers for interest rate forwards, swaps and options as well as eligible liquidity takers for interest rate forwards, swaps and options. The three electronic trading platforms used in Kenya, that is Bloomberg, Citivelocity and Autobahn electronic trading platforms moderates the relationship between market resiliency dimension and the use of financial derivatives in interest rate risk management. The use of the trading platforms in the interest rate derivatives market has an effect on how market liquidity relates to interest rate risk management using financial derivatives in Kenya.

#### **Recommendations of the Study**

The study recommends that commercial bank dealers who are designed to provide clients services that require principal risk taking, a function which is a vital element of market resilience during volatile events, should adopt increased use of electronic trading platforms like Bloomberg and Citivelocity in providing core services to support the real economy. Such diversity is a necessary and welcome development, and complements the role commercial banks and bank dealers will continue to play in effective market functioning thus affecting market liquidity.

# Acknowledgement

My gratitude go to the Almighty God for His mercies and for bringing me this far. I am grateful to my supervisors Dr. Florence S. Memba and Dr. Willy Muturi my excellent guiders in developing the research thesis. I am also grateful to all my PhD lecturers, colleagues and staff of the Nairobi CBD Campus of JKUAT for the assistance extended to me in any way.

#### REFERENCE

- Akdere, M., & Azevedo, R. E. (2006) . Agency theory implications for efficient contracts in organization development. Organization Development Journal, 24(2), 43-54.
- Association Cambiste Internationale Singapore-The Financial Markets Association (2010). ACI Dealing certificate, a study guide. Retrieved from www.acisin.com
- Bagehot, W. (1971) .The only game in town. Financial Analysts Journal, March-April, 12-14.
- Boote, D.N. & Beile, P. (2005). Scholars before researchers: On the centrality of the dissertation literature review in research preparation. Educational Researcher 34(6), 3-15. Available at:
- Carpenter, M. A., Geletkanycz, M. A., & Sanders, W. G.(2004). The upper echelons revisited: Antecedents, elements, and consequences of top management team composition. Journal of Management, 60: 749-778
- Central Bank of Kenya. (2012). Eighth Bi-Annual Report Of The Monetary Policy Committee. Available at http://tinyurl.com/lju3t8s
- Chui, M.(2012). Derivatives Markets, products and participants: An overview of instruments, markets and participants .Retrieved from www.bis.org/ifc/pub
- Copland, T., & Galai, D. (1983). Information Effects on the Bid-ask Spreads. The Journal of Finance, 38(5), 1457–1469. doi:10.2307/2327580
- Corwin, S., & Schultz, P. (2012). A Simple Way to Estimate Bid-Ask Spreads from Daily High and Low Prices, The Journal of Finance, 67(2), 719-759.http://www.jstor.org/stable/pdf/41419709.pdf
- Demsetz, H. (1968). The cost of transacting. The Quarterly journal of Economics, 82, 33-53
- European Systemic Risk Board. (2016). Market liquidity and market-making. Retrieved from https://www.esrb.europa.eu
- Gemloc Peer Group Survey1. (2011). Key Features of Electronic Trading Platforms Gemloc Peer Group Survey1 May 2011.Retrieved from http://siteresources.worldbank.org
- Groves, M.R., Fowler, J., Couper, M.P., Lepkowski, J.M., Singer, E., Tourangean, R. (20 09).Survey Methodology. New Jersey: A john Wiley &sons, Inc, publication.
- Hachmeister, A., & Schiereck, D. (2010). Dancing in the dark: Post-trade anonymity, liquidity and informed trading. Review of Quantitative Finance and Accounting, 34(2), 145-177.http://search.proquest.com/docview/

- Jensen, M. C., & Meckling, W. H. (1976) .Theory of the firm: Managerial Behavior, Agency Costs and Ownership Structure. *Journal of Finance*, 3(4), 305-360.
- Kasomi, F.M. (2015). Diversity in top management, strategy, top managers' compensation and performance of Kenyan state corporations. (*Unpublished PhD thesis*), *University of Nairobi*.
- Long, S. (1997).Regression Models for Categorical and Limited Dependent Variables: Advanced Quantitative Techniques in the Social Sciences: S Publications
- Locke, P. R., & Sarkar, A. (2001). Liquidity supply and volatility: Futures market evidence. *The Journal of Futures Markets*, 21(1), 1-17.Retrieved from http://search.proquest.com
- Nachmias, C.F., Nachmias, D. (2006). Research Methods in the social sciences. Great Britain: Replika Press Pvt
- Okumu, A. N. (2013). Impact of microstructure changes on market efficiency at the Nairobi securities exchange. Unpublished master thesis, Kenyatta University.
- Price water house coopers. (2010). Data gathering and analysis in the context of the MiFID review. Retrieved from bookshop.europa.eu
- Rösch, G.C. (2012) Market Liquidity: An empirical analysis of the impact of the\_nancial crisis, ownership structures and insider trading. Retrieved from
- Rowley, J., & Slack, F. (2004). Conducting a literature review: Management Research News, 27(6), pp. 31-39. Retrieved from <a href="http://mh-lectures.co.uk">http://mh-lectures.co.uk</a>
- Schneider, M.A. (2006). The theory primer: A sociological Guide. New York: Rowman and Littlefield Publishers, Inc
- Sekaran, U. (2003). *Research methods for business*. 4<sup>th</sup> ed. Hoboken, NJ: John Wiley & Sons.
- Shapiro, S. P. (2005). Agency Theory. *Annual Review of Sociology*, 31, 263-284.
- Shing, H. S. (1993). Measuring the Incidence of Insider Trading in a Market for State- Contingent Claims. *The Economic Journal*, 103(402), 1141–1153.
- Tissaoui, K., Ftiti, Z., & Aloui, C. (2015). Commonality in liquidity: Lessons from an emerging stock market, *Journal of Applied Business Research*, 31(5), 1927. http://search.proquest.com
- Wolfswinkel, J. F., Furtmueller, E., & Wilderom, C. P. M. (2013). Using grounded theory as a method for rigorously reviewing literature. *European Journal of Information Systems*, 22(1), pp. 45-55.