Financial Risk and Financial Distress: What we Learn from firms listed at the Nairobi Securities Exchange, Kenya

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ABSTRACT: *Evidence has it that firms all over the world are faced with the problem of financial distress, leading to bankruptcy of some firms. In Kenya, at least 6 listed firms became insolvent and got into liquidation over a period of 10 years (2009-2018) leading to loss of income, unemployment and other negative outcomes. Literature notes that listed firms in Kenya are faced with the problem of financial risk and financial distress. Hence, the financial stability of the existing listed firms should be examined closely since the firms are expected to be stable at any point in time. Financial risk has been linked to financial distress of firms though there is little empirical evidence in developing economies particularly for firms that are listed at the Nairobi Securities Exchange in Kenya. The objective of this paper was to investigate the effect of financial risk on financial distress of firms listed at the Nairobi Securities Exchange, Kenya for the period 2009-2018. The specific objectives were: to assess the effect of Credit, Currency, Interest Rate and Liquidity Risks on financial distress of the firms listed at NSE, Kenya. This study was based on Wreckers theory of financial distress, Trade off theory, Distress theory, Early Bankruptcy theory and the Altman's Z-Score Model for financial distress. The study adopted positivism research philosophy and explanatory non-experimental and descriptive research designs. The targeted population entailed all 66 firms listed at the Nairobi Securities Exchange, Kenya as at 2018. Time Series Cross-Sectional (Panel) secondary data was analysed. The following diagnostic tests were carried out before delving into data analysis: Multicollinearity, Outliers, Heteroscedasticity, Autocorrelation, Linearity, Goodness of Fit, Stationarity and Model Specification. Data analysis was done using descriptive statistics and inferential statistics using Binary Logistic regression model. The findings indicated that: Credit risk (p-value=0.120) was not statistically significant while currency risk (p-value=0.000), interest rate risk (p-value=0.000) and liquidity risk (p-value=0.013) were statistically significant at 5% significance levels. Listed firms in Kenya should be keen to manage their financial risk exposures in order to avoid cases of financial distress. The study recommends that required financial risk levels be set up for firms by authorities with an aim of having a yardstick for measurement mechanisms for firms' efficiencies and protect investors.*
KEY WORDS: financial risk, financial distress, bankruptcy, credit risk, currency risk, interest rate risk, liquidity ris

INTRODUCTION

Distress situations have been observed all over the world across continents hence emphasizing distress as a global problem (Platt & Platt, 2008). This study delved into financial distress which is deemed to affect all firms without respect to the location, type or size of the firms.Financial distress has gained significant attention in the recent past evidenced by empirical and theoretical literature focussing on the area. Various studies have been undertaken on financial distress due to its varied nature (Campbell, Hilscher, & Szilagyi, 2010). This attention calls for in depth analysis of why financial distress is of significance to institutions and the economies of the world in general. Financial distress has been studied across countries all over the world making it a famous topic, with an increasingly upward trend in the interest on the topic due to many reasons and factors (Kazemian, Shauri, Sanusi, Kamaluddin, & Shuhidan, 2017). The subject is increasingly becoming a complex concept by the evidence of many firms deemed stable experiencing distress and becoming bankrupt (Muigai & Muriithi, 2017) is part of the reason, in addition to the fact that many or all firms engaging in any economic activity are not immune to financial distress leading to bankruptcy and closure of operations.

The effects of financial distress if unchecked can lead to bankruptcy of a firm (Boyer & Marin, 2013). Financial distress leading to bankruptcy can be an extremely unpleasant event for any economy, firm or business enterprise. It negatively affects the activity of the economy at large and individual firms (Madhushani & Kawshala, 2018). Its effects can be enormous due to its ripple effect (Chen, Miu, Qiu, & Charupat, 2014) affecting the stakeholders in the firm including the employees/staff of the firms, managers, shareholders, creditors, the government etc. (Baimwera & Muriuki, 2014). Other adverse effects of financial distress include low lender and investor confidence (Koech, Akuno, & Mugo, 2018), loss of shareholders wealth (Mwangi, Muathe & Kosimbei, 2014), higher levels of financial risk (Baimwera & Muriuki, 2014), low market value (Almeida & Philippon, 2006; Viswanatha, 2012; Mahama & Campus, 2015). The effects of financial distress on firms, when analysed, will enable understanding of the concept 'financial distress' which will facilitate reduction of the occurrence of events of financial distress.

Financial risk is one major factor that threatens the survival of many firms all over the world due to its adverse effect on the operations of the firms. Risk threatens the financial viability and firms' long term survival (Muriithi & Waweru, 2017), in effect the financial distress levels of firms. Financial risk is a considerable example of factors affecting the financial distress levels a firm is exposed to and its management is of great consequence to the economic activity levels of a firm and economy at large (Madhushani & Kawshala, 2018). Analysis of risk relating to financial distress of a firm is important for various reasons, among them informing choice of investment between active and passive stocks in financially distressed firms (Outecheva, 2007). Financial risk is important in that it affects almost all firms in operation regardless of location, size, type and other factors (Karanović, Karanović & Gnjidić, 2018), hence partly informing this study.

Generally, empirical literature note that financial distress problem caused by financial risk is the major problem experienced by many firms in Africa (Baimwera & Muriuki, 2014; Mahama & Campus, 2015). Examples of firms that failed in Africa include the South African firms Wabona

(2012-2015) and Mxit (2004-2015), Egyptian firm Ousta (2015-2016) and Nigerian firm Dealdey (2011-2018). Firms in Africa are faced with both problems of financial risk and financial distress. Such risks range from foreign exchange risk especially for firms heavily invested and dependent on oil and energy sectors, credit risks for all firms in the financial sector and other sectors due to their commitments to financial institutions, liquidity risks due to cash flow problems and interest rate risks due to interest rate fluctuations. Investor confidence gets eroded in such cases and firms face cash crunch (Koech *et al.*, 2018). Empirical evidence opine that Africa has had a good share of its firms in various regions facing financial distress due to financial risks (Baimwera & Muriuki, 2014; Mahama & Campus, 2015).

Financial risk variables are many but the most common ones are; Credit, Currency, Interest Rate and Liquidity risks. Firms are exposed to these risks on a daily basis and largely in their operations. Various researchers including Muriithi (2016) used financial risk encompassing risk related to credit (Credit risk), risk related to liquidity (Liquidity risk) and general risk related to the market conditions (Market risk). (See also; Tafri, Hamid, Meera, & Omar, 2009; Dimitropoulos, Asteriou, & Koumanakos, 2010; Muriithi, 2016).

Credit risk is associated with firms that borrow money or firm resources including its debtors and end up being unable to honor their commitment to pay back the same to the firm hence affecting the firm's plans and operations (Zamore, Djan, Alon, & Hobdari, 2018). This study adopted the Degree of Financial Leverage (DFL), measured using earnings before taxes (EBT) to earnings before interest and taxes (EBIT) to measure credit risk. Degree of Financial Leverage implies by definition, the change in earnings per share (EPS) as a percentage that is brought about by earnings before interest and taxes as a percentage (Muriithi, 2016). As employed by Gatsi, Gadzo and & Akoto (2013), DFL focuses directly on the effect of interest from a firm's debt on income before taxes.

Currency Risk refers to the risk that relates to the change in price of one currency with respect to another currency (Gatsi *et al.*, 2013). Currency risk is commonly and sometimes referred to as the exchange rate risk or foreign exchange risk because there is always uncertainty in the market concerning the rate of change of a currency relating to another since such rates change or get adjusted from time to time or many times on a given day (Lambe, 2015; Mwaurah, 2015), thus causing currency crises. Currency instability is one of the major factors negatively impacting the economies of emerging markets and performance of major equity indices (Capital Markets Authority, 2018). This study employed the Open Position Ratio to measure foreign exchange risk as used by (Parlak & İlhan, 2016).

Interest rate risk regards the risk arising from adverse changes in the levels of interest rates in the market, which affects an investment (Ngalawa, 2014). Uncertainty in future interest rates affects the economic activity levels in the future (Bretscher, Schmid, & Vedolin, 2016). Firms are faced with the interest rate uncertainty in the market posing a risk to them (Capital Markets Authority, 2018). This study employed the Yield Implied Volatility (YIV) as a measure of interest rate risk.

Yield Implied Volatility is a proxy for interest rate uncertainty, i.e., a price for hedging interest rate uncertainty. It predicts the volatility in the activity of a firm due to changes in interest rates (Cremers, Fleckenstein, & Gandhi, 2017).

Liquidity risk concerns market unpredictability where firms end up not getting cash as and when anticipated from the market (Muriithi & Waweru, 2017). It is associated with market volatility whereby assets and securities cannot be easily converted into cash leading to inadequate finances for firms to honour their commitments (Mwaurah, 2015). Lower credit rating is associated with credit risk of firms while high volatility of earnings due to currency movements increases the currency, foreign exchange and interest rate risks of firms. Coupled together, the risks contribute a great deal concerning the extent of the financial distress levels of firms that can lead to bankruptcy (Capital Markets Authority, 2018). Liquidity coverage ratio was employed in this study as the measure for liquidity risk. The ratio relates to the firms' assets that are highly liquid, which are held by the firms to meet short-term obligations and in so doing promote the resilience, albeit short-term, of the firms' liquidity risks.

Problem Statement
The NSE plays a critical part in the Kenyan economy and firms listed at the NSE contribute significantly to the Kenyan economy GDP (Katambani, 2014). In addition, Kenya is considered an economic hub in the region due to its ability to attract domestic and foreign direct investment due to its enhanced capacity through trading in securities (Capital Markets Authority Q4, 2018). The Kenyan government put in place regulations and authorities such as the insolvency bill in 2014 and the Capital Markets Authority. The insolvency bill was enacted in order to cushion firms having cash flow problems from the unexpected, often uncalled for decisions by the receivers that plunged firms into bankruptcy in the past (Insolvency Bill, 2014).

Financial distress has been a challenge of firms listed at NSE and substantial evidence has been documented to that extent. Empirical literature notes that financial distress, credit, currency and liquidity problems still remain a concern of the firms listed in Kenya (Maina & Sakwa, 2017; Nairobi Securities Exchange, 2019). The NSE market experienced different periods trading with different number of firms at any one time due to various reasons including firms placed under administration, suspension and delisting of some firms from the market (Maina & Sakwa, 2017; Guguyu, 2018).

Despite the listed firms in Kenya contributing much to the economy and their significance, their exposure to increasing financial distress is yet to be clearly linked to their financial risk. As much as this relationship has been documented in other countries, this remains an issue for investigation especially in Kenya hence this study sought to deal with this contextual gap. Despite the various reforms, regulations and authorities set up in Kenya to ensure a sound and proper working NSE, financial distress is a problem experienced by listed firms in Kenya.

LITERATURE REVIEW

Theoretical Review

This study's variables were anchored on four theories and a model namely: Wreckers theory of financial distress that relates to Liquidity risk and distress, The Trade-off theory which relates to credit risk and interest rate risk of firms, Finance Distress Theory that associates with Credit and Liquidity Risks, Early Bankruptcy theory and the Altman Z-Score model; a Distress Determinant model that relate to financial distress.

Wreckers Theory of Financial Distress

Kalckreuth, (2005) propounded the theory. The theory introduced the financial distress concept while relating it to a ship wreck for the benefit of a few individuals, exposing a problem of governance. Poor governance/management affects many firms leading them to distress than economic distress does (Whitaker, 1999). During the act of wrecking, investors withdraw their finances from the firm with the thought of saving themselves from further loss that may be brought by the firm on their resources (Kalckreuth, 2005). This is with the understanding that they are not awarded or compensated enough for holding such stocks (Campbell *et al*., 2010). The theory underpinned the currency risk faced by a firm due to volatility of share prices and the dependent variable as it brings out the understanding of why some firms face financial distress, which arises due to currency risk. Additionally, insider information, if managed properly can be used as a risk reduction mechanism for financial distress facing a firm in terms of enabling better management of a firm's, currency, credit and liquidity risks.

Trade-off Theory

The theory was proposed by Myers (1984). The theory links financial distress to a firm's credit and interest rate risk. The theory discusses the cost of financial distress and agency costs to a firm. It postulates that there exists a trade-off related to bankruptcy and interest tax shield in circumstances when the debt/equity ratio goes up. It indicates an advantage to a firm when it finances its activities using debt in that the firm benefits from the tax benefits thereof (Muller, Steyn-Bruwer, & Hamman, 2012; Çerkezi, 2013). In situations when the levels of debt reach beyond the management of the firms, the firms will be unable to meet their debt obligations as and when required hence facing the distress risks that are associated with such failures (Zurigat, 2009; Canarella, Nourayi, & Sullivan, 2014). By giving the platform for analysis of the firms' costs related to credit and interest rate risk, the theory enabled better understanding of how the two variables did or did not have effects on the financial distress of NSE listed firms. This theory underpinned this study in enabling better understanding of how credit and interest rate risk can ultimately negatively affect the listed firms hence the need to ensure proper and calculated trade-off at all levels.

Finance Distress Theory

This theory was propounded by Baldwin and Scott (1983) whereby they postulated that firms enter into states of financial distress when they fail to honor their debt commitments as and when required. The failure is due to deterioration in their profitable activities (Yang *et al.*, 2013). The initial stage of financial distress is the failure to honor the debt obligations and failure to pay or a reduction in the dividends paid to shareholders (Baldwin & Scott, 1983). The theory postulates that the financial distress effects are felt before default risk is noticed. Default is associated with credit risk and can be measured by the amount of time a debt remains unpaid after the due date (Davydenko, 2005).

Early Bankruptcy Theory

The theory was proposed by Alder (2002). The necessity for a formal bankruptcy theory was realized through the recognition that there was a need to have in place a bankruptcy system to deal with the creditors of a firm which is in distress, in a way that will combine their issues together (Schwartz, 2005). Situations call for the need for a government to put in place a bankruptcy system that provides for a stay on creditor collection efforts at least until the firm is beyond salvage for liquidation processes to happen (Alder, 2002; Schwartz, 2005). NSE listed firms enjoy the provision and regulation by the Kenyan government in terms of the insolvency act no. 18 of 2015 and subsequently revised in 2016 that oversees the affairs of bankruptcy from individual basis to corporate bodies.

Altman Z-Score Model

The Altman model, a multivariate discriminant analysis (MDA) tool brings together eight accounting variables; Current liabilities, Current assets, Non-current assets, Earnings before interest and taxes (EBIT), Long term liabilities, Retained earnings, Book value of equity and Net sales (Altman, 1968). The most commonly used model is the Altman's model developed in 1968. MDA is the most popular technique in identifying probability of business failure and appears as setting a standard for other business failure prediction models with an average bankruptcy prediction accuracy of more than 85% (Aziz & Dar, 2006; Maina & Sakwa, 2017). The Altman Z-Score model has great ability to predict financial distress in firms and is therefore a good model in evaluating risk of corporate distress (Samarakoon & Hasan, 2009).

Empirical Review
Credit Risk and Financial Distress

Gichaiya, Muchina and Macharia, (2019) delved on a closer analysis of financial distress of NSE listed firms using hierarchical panel data regression analysis. The study notes that previous studies concentrated on financial distress modelling while others concluded conflicting findings on firm risk exposures and financial health. A direct and significant influence was found to exist between corporate risk and financial distress of non-financial NSE listed firms. A study was conducted by Ogilo (2012) on the effect of credit risk management on commercial banks'

financial performance. The finding was that indeed there is a strong impact between credit risk management and financial performance and that CAMEL model can also be employed as a representation for credit risk management (Ogilo, 2012). Yang, Li and Zongfang (2013) assessed risk from the viewpoint of the amounts of guarantee and how it affects credit risk. The study found that the relationship between credit risk and amount of guarantee is nonlinear which means that the more a business has a higher guarantee, the lower the risk it is exposed to. The study further found that different structure of guarantee exposes the business to a different credit risk level.

In a study conducted by Abuga and Memba (2013), a scrutiny of the causes of financial distress using firms funded by ICDC in Kenya was done. Factor analysis indicated that finance factor is comparatively the major cause of financial distress. This study is accordant with other studies including Outecheva (2007) and Atosh (2017) who identified various factors of financial distress including financial risk levels, governance and government policies. A study conducted by Zamore *et al*. (2018) on an assessment of credit risk across 72 countries. The study findings bring to the fore the fact that credit risk management is multifaceted with classifications into six streams among them being comparative analysis of credit models and credit markets. The study is consistent with a study by (Poudel, 2018) that found that credit risk has a negative significant effect on the profit of a firm. The first hypothesis, as shown below, was developed based on the research gaps noted from the above discussion.

H_{01}: Credit Risk has no significant effect on Financial distress of firms listed at the NSE, Kenya.

Currency Risk and Financial Distress
Currency risk is often referred and used interchangeably with foreign exchange risk (Papaioannou, 2006; Lambe, 2015). Foreign exchange risk is "the difference between foreign exchange dominated financial and commercial assets and foreign exchange denominated liabilities" (Parlak & İlhan, 2016). Firms are considered to have foreign exchange risk when the liabilities represented in foreign currency exceed the assets represented in the foreign currency. Boyer and Marin in 2013 conducted a study to examine the impact of hedging instruments denominated in foreign currency on the risk of financial distress by manufacturing firms in the US during 1996 – 2004. The study found that managing foreign currency can help reduce bankruptcy of firms. This is so in that the foreign currency hedging instruments' use reduces financial distress of firms, a concept associated with bankruptcy of firms worldwide (Boyer & Marin, 2013).

Lambe (2015) assessed the impact exchange rate risk has on Nigerian banks' performance. The study found out that a significant relationship exists between foreign exchange management and performance of financial institutions, particularly banks and that currency risk management affects the profitability of banks and financial institutions. Similar studies linking performance and financial distress found that performance is better for firms with low financial leverage than firms with high financial leverage hence there is a negative significant relationship between

performance and financial distress (Tan, 2018; Mahmood, Rizwan & Rashid, 2018). The second hypothesis of this study was developed based on the research gaps noted from the above discussion as shown below.

H_{01}: Currency Risk has no significant effect on Financial distress of firms listed at the NSE, Kenya.

Interest Rate Risk and Financial Distress
Interest rate risk is the vulnerability emanating as a result of earnings and capital, either in the current or future or both in relation to changes in interest rates (FHFA, 2013). The risk relates chances of declines in asset values that is due to unexpected fluctuations in interest rates. A negative and significant effect of interest rates on a firm's economic activity is noted to exist. The firms' economic activity levels in the future are due to the uncertainties in interest rate levels.

A study by Lenee and Oki (2017) on the effect of financial derivatives on firm performance in the UK had an objective of determining the impact of hedging on ROA and capital employed, among other objectives. The study result was that hedging interest rate risks has a positive effect on ROA hence firm performance. Stakeholder and financial distress theories of financial risk management were supported through the study (Lenee & Oki, 2017). Délèze and Korkeamäki (2018) studied interest rate risk management with debt issues in European firms. The study used data of 17 countries for the years 1990 to 2007 obtaining 62164 firm-year ends for analysis. The study found out that firms try to manage their interest rate risks using issue of new debts. The lack of literature and information on the effect of interest rate risk on listed firms in Kenya creates a conceptual gap that this study sought to fill. The study therefore developed a third hypothesis as shown below to fill in this gap.

H_{01}: Interest Rate Risk has no significant effect on Financial distress of firms listed at the NSE, Kenya.

Liquidity Risk and Financial Distress
Liquidity is regarded as the firm's capability in having enough finances to handle its immediate current obligations as and when they arise. Two of the five major areas leading institutions are focusing their efforts currently include liquidity risk appetite and liquidity risk (Venkat, Mikulka & Magstadt, 2010). Xiao (2016) sought to examine the effect liquidity risk has on banks. The study found that liquidity risk mostly affects financial institutions and especially banks in that they are the determinants of almost all the activities of banks consequentially affecting the economic stability of a country which contribute to the economy of the world.

Fredrick, Jeremiah and Onsomu (2018) studied liquidity risk and collapse of Kenyan commercial banks and found that liquidity risk increased the probability of failure by banks. An assessment by Xiao (2016), of liquidity risk management of Chinese banks found that institutional and

structural factors affect liquidity positions and liquidity risk of banks. Karanović *et al*., (2018) investigated risk management and liquidity risk management in Croatia. The study brought to the light the fact that most Croatian managers didn't have sufficient financial knowledge that could enable them better take care of liquidity risk and its effects, among other factors, leading to a large number of illiquid businesses in the country. Financial knowledge especially on liquidity and liquidity risks can therefore be viewed as empowerment that is crucial in curbing against illiquidity hence avoiding risks associated with it.

Financial distress has grown to be a wide concept and topic that is eliciting interest from individuals and corporates including government, students, researchers and institutions. The interest in the topic has established financial distress as a body of research and field of investigation on its own (Sami, 2014). Factors affecting financial distress and the stretch to which they have an effect on survival of a firm are areas of interest to many firms, if not all firms (Baimwera & Muriuki, 2014; Nyamboga, Omwario, Muriuki, & Gongera, 2014). The effect of financial risk on financial distress is a study not yet undertaken in Kenya hence the need for such a study during this period when NSE listed firms in Kenya are facing financial distress and financial risk problems. The lack of empirical studies in this area creates an empirical gap that this study sought to fill. Hence this study formulated the fourth hypothesis as below to fill in this gap.

H_{01}: Liquidity Risk has no significant effect on financial distress of firms listed at the NSE, Kenya.

RESEARCH METHODOLOGY

Explanatory non-experimental and descriptive designs were employed in this study. Explanatory studies have an emphasis on establishing and explaining causal relationships (Saunders, Lewis & Thornhill, 2007). Explanatory studies aim at obtaining the cause and effect between variables (Robson, 2002; Sekaran & Bougie, 2011) hence was appropriate for this study. Kerlinger and Lee, (2000) stipulate that application of the explanatory non-experimental research design should be in a situation where there needs understanding of the behaviour of various phenomena by establishing the variables that contribute to the behaviour without influencing the variable via any further analysis on the variable. Descriptive designs afford a researcher with more information from established groundworks through other basic designs (Musau, 2018).

Different methods are employed by different researchers in determining the size of the samples to be used in their studies. Census enabled the collection of the detailed data of every firm under study hence increasing the statistical power and accuracy of the findings, accordingly improving the validity of the findings (Mwangi *et. al*., 2014). The data collected is rich and specific to the population, hence legitimate. Census method is recommended when the target population is 200 or less, like it was the case in this study which had 66 firms listed at the NSE, Kenya as at 2018.

This study employed quantitative secondary data. Secondary data was employed because it is objective and not prone to undue influence by the researcher. In addition, the secondary data was readily available from authentic sources that included the NSE handbooks, firms' financial statements, firms' reports, CBK etc.

This study compiled quantitative panel data. Panel data enables studying the behaviour over time and across space (Gujarati, 2003; Baltagi, 2005) hence was appropriate and employed in this study. Cross sectional time-series data was collected from the target population. Using cross sectional time-series data (panel data/longitudinal data) enables tackling complex problems and increases the power of the test by increasing degrees of freedom (Brooks, 2014). Multivariate models have the ability to bring out the simultaneous interactions between variables, a characteristic previously lacking in univariate models (Chenchehene & Mensah, 2014) hence was appropriate for the study. The Altman Z-Score (applicable to **publicly traded firms)** was employed in this study to enable classification of firms into distressed vs not-distressed firms. The Model is captured below:

$$Z_{it} = 1.2X_{1it} + 1.4X_{2it} + 3.3X_{3it} + 0.6X_{4it} + 1.0X_{5it} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots 3.1$$
(Altman, 2000)

Where: Z_{it} = Overall Index/Score for firm i and time t
X_{1it} = Working Capital/Total Assets for firm i and time t
X_{2it} = Retained Earnings/Total Assets for firm i and time t
X_{3it} = EBIT/Total Assets for firm i and time t
X_{4it} = Market value of equity/Book value of total liabilities for firm i and time t
X_{5it} = Sales/Total Assets for firm i and time t
i = Individual firm
t = Time (year)
The variables are explained as follows:
Z – Signals the financial condition of the company which is classified as either
X_1 – Computes the net liquid asset of a firm considering the total assets
X_2 – This ratio computes the financial leverage level of a firm
X_3 – This ratio computes the productivity of a firm's total assets
X_4 – The ratio computes the segment of a firm's assets that is capable of reducing in value prior to liabilities exceeding the assets.
X_5 – This ratio computes the ability of a firm's assets to bring about revenue
The zones specifications for discriminations which are used to decide on the firms are as follows:
$Z > 2.99$ – "Safe" Zone, $1.8 < Z < 2.99$ – "Grey" Zone, $Z < 1.8$ – "Distress" Zone
After computing the Z-Score, the scores were grouped into the two categories of distressed (Below 1.8 Z-Score) vs not-distressed (Above 1.8 Z-Score) and then loaded into the SPSS statistical software as the values for the dependent variable (Financial distress) for purposes of running the Binary logistic regression analysis.

Binary Logistic Regression Model

Logistic regression analysis is best suited to describe and test hypotheses about associations between variables (Tukur & Usman, 2016) and is useful and appropriate where the dependent variable is dichotomous (Field, 2005; Muathe, 2010; Sheikh *et al.*, 2015; Berger, 2017). Logistic Regression analysis is a predictive analysis that is used to describe data and to explain the relationship between one dependent binary variable (financial distress) and more than one independent statistically measurable variable (financial risk in its various dimensions) and it is also one of the methods linked with distress studies (Balcaen & Ooghe, 2004; Aziz & Dar, 2006) hence was the most appropriate for this study. It has been employed in other studies including: (Muathe, 2010; Waithaka, Mburu, Korir, Muathe and Obere, 2013; Mungai, 2015; Githaiga, 2019).

Logistic regression estimates a multiple linear regression function defined as;
Logit (p)

$$= \log\left(\frac{P(y=1)}{1-(p=1)}\right) = \beta_0 + \beta_1 \cdot x_{i2} + \beta_2 \cdot x_{i2} + \dots + \beta_p \cdot x_{in} \quad \dots\dots\dots\dots\dots\dots\dots 3.2$$

For i = 1 …… n

The above general logistic regression model was employed in this study as

$$\text{Logit (p)} = \text{Log}\left(\frac{p(y=1)}{1-(p=1)}\right) \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \varepsilon it \dots\dots\dots 3.3$$

Where:
$it = i$ for Firm 1, 2. …... 66 and t for time period 1,2 …10
β_0 = Constant
$\beta_0, \beta_1 \dots \beta_4$ = Regression coefficients
X_{1it} = Credit Risk for firm i at time t
X_{2it} = Currency Risk for firm i at time t
X_{3it} = Interest Rate Risk for firm i at time t
X_{4it} = Liquidity Risk for firm i at time t
ε = Error term

Statistical Tests and Hypotheses

The null hypotheses were tested using the p-value criteria for testing hypothesis at 0.05 level of significance for 2-tailed test. It is the most suitable inferential statistical tool that can be used as a determinant of whether there exists significant relationship between variables or not (Cohen, Manion & Morrison, 2011). The table below indicates the decision criteria that was applied on rejecting verses failing to reject the null hypotheses:

RESULTS

Financial distress is a binary variable and thus the logit model was used to test the four hypotheses. The results are as indicated in table below.

Table 1: Logit regression: Financial Risk and Financial Distress of firms listed at the NSE, Kenya

	β	t =β/S.E.	Wald	*p*-value
Credit Risk	0.192	1.5609	2.4140	0.1200
Currency Risk	-1.099	-4.1787	17.5060	0.0000
Interest Rate Risk	3.089	3.8516	14.8410	0.0000
Liquidity Risk	0.468	2.4894	6.1720	0.0130
Observations (n)		631		
Nagelkerke R Squared		0.060*		
Model Chi-Square	(4 df)	28.6160		0.0000
Classification Rate		67.7%		
-2 Log Likelihood		829.2480*		
Hosmer and Lemeshow Chi-Square Test	(8 df)	11.4900		0.175
Total *N* Steps	4			
Constant	0.1240	0.7654	0.5810	0.4460
Note: *$p \leq 0.01$				

Source: Survey Data (2021)

The omnibus test (includes Chi-Square, df and significance level) checks whether the new model, with explanatory variables included, is an improvement over the baseline model. Using Chi-square tests, the test is used to check if there is a significant difference between the log likelihoods of the baseline model and the new model.

The results indicate that the new model shows a significantly reduced -2LL (Log likelihoods) compared to the baseline hence suggesting that the new model is explaining more of the variance in the outcome and is an improvement. The Chi-square is highly significant (chi-square = 28.616, df = 4, p = 0.000) hence the new model is significantly better. The sig. values are *p <0.001,* which indicates that the accuracy of the model improves with addition of more of our explanatory variables.

To test whether the model was a good fit of the data, the Hosmer-Lemeshow test was conducted. The Hosmer & Lemeshow test of the goodness of fit suggests the model is a good fit to the data. The result was a Hosmer and Lemeshow test of 11.4900 with 8 degrees of freedom and p-value of 0.175 (p > 0.05) is non-significant. The result is in agreement with Muathe's (2010) study. A classification table that included the explanatory variables was also derived and results were as

shown above. The results show the total of how the outcomes were classified giving a total number of observations of 631 and overall classification percentage of 67.7%. The total number of observations (631/660 = 95.6%) was crucial in reducing the errors in the analysis (Type I and Type II errors), as explained in chapter 3. The results from the table indicate that 67.7% of the cases were correctly classified by the study model, a much improvement from the null model.

Table for regression coefficient (β), the Wald statistic (to test the statistical significance) and the Odds Ratio (Exp (β) for each variable category was produced and the fit of the regression (linearized equation for financial risk on the firms) produced the model fit as below.

$\text{Log } (p/1 - p) = 0.12$

4 - 1.099X_2 + 3.089X_3 + 0.468X_4

The variables fitted in the model were as follows; Credit risk = X_1, Currency risk = X_2, Interest rate risk = X_3 and Liquidity risk = X_4. The table above presents the logit model estimation results of financial risk and financial distress of firms listed at the NSE, Kenya.

From the results in table, this study therefore concludes that financial risk has an effect on financial distress in that when the financial risk levels are high/low, there is a high/low possibility of financial distress associated with the firm. The results from this study are consistent with other studies which established that business financial soundness is dependent on the financial risk management in place (Bokpin, Aboagye, & Osei, 2010). Sub Saharan Africa has made substantive growths in areas touching on efficiency concerning disseminating information, economic growth and to some extent and context, political stability, but the management of financial risk for firms remains a high priority (Deloitte, 2013; Capital Markets Authority, 2018). Financial risk is regarded as both a universal and global phenomenon hence firms in all parts of the world should manage the risk levels to avoid cases of financial distress (Karanović *et al.*, 2018).

Three (Credit Risk, Interest Rate Risk and Liquidity Risk) of the β coefficients for the study variables were positive indicating that increasing financial distress is associated with increased odds of financial risk of firms listed at the NSE, Kenya while 1 (Currency Risk) was negative, indicating that increasing financial distress is associated with decreased odds of financial risk of the NSE listed firms. The Exp (B) column (the Odds Ratio) indicates that Interest rate risk has the highest likelihood of causing financial distress of firms (21.966 times) as compared to the other variables. The other variables' likelihood based on the odds ratios were as follows: Credit risk (DFL) = 1.211 times, Currency risk (OPR) = 0.333 times and Liquidity risk (measured using LCR) = 1.596 times.

The Wald Chi-Square statistic which tests the unique contribution of each independent variable with respect to the other independent variables returned a result of non-significance for all the 6 variables under study. One out of the four independent variables were not statistically significant with the p-values as indicated in brackets; Credit Risk (Measured by Degree of Financial

Leverage (*p=0.120*). Currency Risk (Measured by Open Position Ratio (*p=0.000*), Interest Rate Risk (Measured by Yield Implied Volatility (*p=0.000*) and Liquidity Risk (Measured by Liquidity Coverage Ratio (*p=0.013*) were statistically significant. These results imply that financial distress of firms listed at the NSE, Kenya is significantly influenced by currency, interest rate and liquidity risks and not credit risk.

H_{01}: Credit Risk has no significant effect on Financial Distress of firms Listed at the Nairobi Securities Exchange, Kenya

Credit risk was measured using the Degree of Financial Leverage. The study therefore sought to test the hypothesis H_{01}: Credit Risk has no significant effect on financial distress of firms listed at the NSE, Kenya. The result from the analysis is as presented in table 4.10. The result indicates a p-value of 0.120, which is above the significance level of 0.05. Hence, the study fails to reject the null hypothesis leading to the conclusion that Credit Risk has no significant effect on financial distress of firms listed at NSE, Kenya.

This result implies that NSE listed firms' financial distress is not sensitive to fluctuations in the firms' EPS in relation to the firms' operating incomes. The coefficient of Credit Risk was positive and non-significant implying a positive relationship between credit risk and financial distress. This means that the higher the level of financial leverage a firm has, the higher is the probability of the firm plunging into financial distress, though the chance is not statistically significant to warrant extra ordinary measures.

This result disagrees with Okello (2015) that financial leverage is the strongest determinant of financial risk of listed firms at the NSE, Kenya and to the extent that the study indicates that financial leverage easily influences financial distress in Kenya listed firms. This cannot be the case since this study found that degree of financial leverage is insignificant in impacting financial distress. However, the study did not delve on all firms listed at the NSE, Kenya. The current study agrees with the study by Kosikoh (2014) that a positive relationship exists between leverage and financial distress. However, the study only focussed on insurance firms in Kenya. This study further disagrees with Nyamboga *et. al* (2014) who concluded that financial leverage does have a significant influence on corporate financial distress. However, the study only focussed on non-financial firms listed at the NSE, Kenya.

This study is consistent with other studies including Outecheva (2007), Abuga & Memba (2013) and Atosh (2017) who identified various factors of financial distress including financial risk levels, governance and government policies.This study concludes that degree of financial leverage does not have a significant impact on the financial distress of firms listed at the NSE, Kenya. Based on the negative coefficient of credit risk, this study further concludes that the higher the degree of financial leverage, the lower the financial distress a firm will be exposed to. Generally, degree of financial leverage still remains a factor of financial distress and recommendations for further research have been suggested in the same area (Sporta, Ngugi,

Ngumi & Nanjala, 2017). Firms should therefore seek to reduce their credit risk levels in order to reduce chances of financial distress.

H_{02}: Currency Risk has no significant effect on Financial Distress of firms Listed at the Nairobi Securities Exchange, Kenya

Currency risk was measured using Open Position Ratio. The study therefore sought to test the hypothesis H_{02}: Currency risk has no significant effect on financial distress of firms listed at the NSE, Kenya. The result from the analysis is as presented in table 4.10 above where the result indicates a p-value of 0.000 for currency risk. The p-value is below the significance level of 0.05. Hence, the study rejects the null hypothesis leading to the finding that currency risk has a significant effect on financial distress of firms listed at the NSE, Kenya.

This result implies that financial distress of the listed firms is sensitive to the retail spot activities on the trading platform. The activities should therefore be observed and managed efficiently in order to avoid instances of financial distress emanating from them. The coefficient of Currency risk was negative and statistically significant. This implies that there is a negative relationship between currency risk and financial distress. This means that the higher the level of currency risk a firm has, the lower is the probability of the firm plunging into financial distress. The chance is also statistically significant to warrant extra ordinary measures.

Based on the negative coefficient of currency risk, this study finding is that the higher the currency risk, the lower the financial distress a firm will be exposed to. Firms should therefore seek to manage their currency risk levels in order to reduce chances of financial distress. The results from this study agree with other studies including: Boyer and Marin (2013) who found that managing foreign currency can help reduce bankruptcy of firms since using hedging instruments reduces financial distress, Prasad and Devji (2018) who argued that exchange rate movements have a greater effect on firm value and the financial distress of a firm and found that firms with greater exchange rate movements have a greater probability of financial distress. Measuring and managing exchange risk exposure by firms by using best acceptable practices is therefore important to avoid such adverse situations in the long run.

Wei and Starks (2013) found that firms which are financially distressed cannot manage foreign exchange exposure adequately. Currency risk should therefore be managed at its earliest notice in order to avoid such scenarios, which can lead a firm to be financially distressed and bankrupt (Wei & Starks, 2013). The results of a study by Wei and Starks (2013) on foreign exchange exposure volatility and financial distress is consistent with Balu and Armeanu (2017) in that exchange rate exposure elasticity is related to proxies for likelihood of financial distress. The efficient management of such risks is therefore essential if the firms consider their survival in the future. It is argued that firms that do not manage foreign currency exposures are at a higher risk of distress that can lead to bankruptcy in the long run (Boyer & Marin, 2013).

Khan *et al.*, (2017) agree with this study that management of FX risk exposures by firms is essential for firm survival in the long run, a finding similar to other studies including (Balu & Armeanu, 2017). Akhigbe, Martin & Mauer (2014) who conducted a study on the influence of financial distress on foreign exchange exposure of 409 MNCs in the USA investigated the presence of a non-monotonic relationship between financial distress and FX exposure. Borrowing from similar findings of other studies including Wei and Stacks (2013) and Balu and Armeanu (2017), the hypothesis was that the firms with higher FX exposures would be those that carried the lowest levels of financial distress.

The non-monotonic relationship between the variables is such that as financial distress levels increase, the FX exposure sometimes increases and sometimes decreases. The uncertainty in this case contradicts other previous studies that suggest management of FX risk by firms may mean success or failure of the firms in their futures, such as the study by Balu and Armeanu (2017). The current study concludes that a positive relationship exists between FX exposure and financial distress, hence firms should seek to reduce their FX exposures to minimize chances of financial distress. Currency fluctuations should therefore be properly managed on trading platforms in order to avoid instances of financial distress.

H_{03}: Interest Rate Risk has no significant effect on Financial Distress of firms Listed at the Nairobi Securities Exchange, Kenya
Interest Rate risk was measured using Yield Implied Volatility. The study therefore tested the hypothesis H_{03}: Interest Rate Risk has no significant effect on financial distress of firms listed at the NSE, Kenya. The results from the analysis in table 4.10 above indicate a p-value of 0.000 for interest rate risk. 0.000 is below the required p-value of 0.05 hence the study rejects the null hypothesis. The study therefore makes a finding that interest rate risk has a significant effect on financial distress of firms listed at the NSE, Kenya.

The coefficient of Interest Rate Risk was positive and significant implying a positive relationship between Interest Rate Risk and financial distress. This means that the higher the level of interest rate a firm is exposed to, the higher is the probability of the firm plunging into financial distress. The chance is statistically significant to warrant extra ordinary measures. Based on the positive coefficient of the variable of interest rate risk, this study finds that the higher the interest rate risk, the higher the financial distress a firm will be exposed to. Firms should therefore seek to reduce their interest rate risks levels in order to reduce chances of financial distress.

The current study agrees with Bretscher *et al.*, (2016) who investigated the effect of interest rates on a firm's future certainty using regression analysis and noted that interest rate risk shocks always have adverse effects on firms' profitability and outlook that can lead to financial distress. Managing interest rate risk helps in reducing default probabilities and credit spreads by debtors of firms. assessed the effect of interest rate risk management in uncertain times on firms' activities in that firm's activities tend to slow down during interest rate uncertainties in the market.

Bretscher, Schimd and Vedolin (2018) results showed that uncertainties concerning interest rates in the market negatively affect financially distressed firms in the market due to the fact that their hedging opportunities using swaps is potentially risky for such firms. This paper agrees with the results of the study in that as adduced, with an already struggling firm, interest rates compound their problems that lead them to being more distressed (Bretscher *et al.*, 2018).

H_{04}: Liquidity Risk has no significant effect on Financial Distress of firms Listed at the Nairobi Securities Exchange, Kenya
Liquidity risk was measured by Liquidity Coverage Ratio. The study sought to test the following hypothesis H_{04}: Liquidity risk has no significant effect on financial distress of firms listed at the NSE, Kenya. The result from the analysis as presented in table 4.10 above indicates a p-value of 0.013 for liquidity risk, which is below the significance level of 0.05. Hence, the study rejects the null hypothesis leading to the finding that liquidity risk has a significant effect on financial distress of firms listed at the NSE, Kenya. The coefficient of Liquidity Risk was positive and statistically significant. This implies that there is a positive relationship between liquidity risk and financial distress. This means that the higher the level of liquidity risk a firm is exposed to, the higher is the probability of the firm plunging into financial distress. The chance is also statistically significant to warrant extra ordinary measures.

The implication is that transaction costs arising from price impacts, limited market depth in trading in securities and bid ask spreads should be properly managed by capital market participants, an observation by Acharya (2006). Based on the positive coefficient of liquidity risk, this study found that the higher the Liquidity Coverage Ratio, the higher the chances of financial distress a firm will be exposed to. Firms should therefore seek to reduce their liquidity risk levels in order to reduce chances of financial distress. Gedion and Aloo (2020) explain that Firms should seek proper working capital management practices, especially proper creditors average payment period, debtors' average collection period and the cash conversion cycles (CCC) since they were found to significantly affect liquidity risk of firms.

These findings are consistent with other studies including Xiao (2016) on liquidity risks. The study notes that all firms have an exposure to liquidity risks hence generalization of findings should hold. Farooq *et. al.,* (2015) analyzed the effect of liquidity risk on financial and banking sectors and found that liquidity risk is such a huge risk in the financial sector and banking sector hence its effects and causes need not be ignored at all levels of any firm's operations. This is due to its significant effect on financial distress as also found out in this study. Financial institutions especially banks survive only well if they can manage their liquidity levels such that they can afford onward lending their clients (Farooq *et al.*, 2015). Fredrick, Jeremiah and Onsomu (2018) studied liquidity risk and failure of commercial banks in Kenya. The study finding was that liquidity risk increased the probability of failure by banks.

Some findings from studies like Marozva (2015) conflict other studies that found that risk is negatively related to return of firms which ultimately leads to financial distress situations. Based on the study findings, liquidity risk is noted to contribute significantly to financial distress of listed firms at the NSE, Kenya. The challenge for financial managers is therefore to find the balance between liquidity and profitability that will ensure good continuity in operations hence good profitability and liquidity that avoids distress in the long run (Marozva, 2015). The current study further agrees with a study by Fredrick (2018) that observed that a positive correlation between liquidity risk and failure is an indicator that a failed firm took on the precautionary motive of the liquidity reference theory, thus the option of the liquidity of a firm, based on liquidity preference theories, has a bearing on the result linking liquidity and failure. This study also agrees with Hakimi and Zaghdoudi, (2017) who found that liquidity risk affects and threatens the stability of banks and leads to instability of banks and failures.

This study agrees with Olawanle (2014), who investigated the effect of liquidity risks on firm performance and profitability that measuring liquidity levels is important in the determination of its effect on performance of firms and profitability which affect distress of a firm. To appropriately evaluate liquidity, transparency, especially in the financial system needs to be enhanced all with the view of avoiding problems associated with negative exposure (Olawanle, 2014). Liquidity risk is considered a short term risk (Marozva, 2015) in a business since such liquidity positions of firms change within a short period of time due to various factors. Firms should therefore constantly check their liquidity level positions and work at optimal liquidity levels in managing their liquidity risk exposures.

CONCLUSION AND RECOMMENDATIONS

Financial distress in itself may be brought about by various factors as earlier noted. With this understanding, this study takes the discussions to a further higher level and it is hoped will enhance understanding of the topic and mitigation measures from the risks faced and therefore reduce incidences of financial distress in firms. Listed firms in Kenya that put in place measures to manage financial risks, especially by properly managing their currency, interest rate and liquidity risks (since they have significant impacts on financial distress of the firms listed at the NSE, Kenya) will avoid instances of financial distress.

Conducting more wider and deeper research on the financial distress of the listed firms will enhance knowledge and understanding in the area of financial distress and the listed firms will avoid instances of financial distress. The governance of the NSE should invest in the area of research and policy in order to enable better understanding of the problem of financial distress of the listed firms, so that to avoid their plunging into bankruptcy. The Nairobi Securities Exchange (NSE), Kenya plays a crucial role in the Kenyan economy and the listed firms contribute significantly to the GDP of the Kenyan economy. The stability of the listed firms is therefore of paramount importance in ensuring a stable financial market, a stable society and ultimately a stable economy.

The NSE has responsibilities of developing the market for trading securities and keeping an eye on the trading activities of firms on the market, which should be done more keenly. The decision makers at the NSE, Kenya should concentrate more of their efforts on putting in place measures for managing financial distress and financial risk by firms in order to reduce instances of financial distress caused by financial risk. For example, they should incorporate, among their core values, firm value enhancement virtue(s) that would propel them to think more about the specific listed firms.

Kenya is considered an economic hub in the region due to its ability to attract domestic and foreign direct investment. This is due to its enhanced capacity through trading in securities. As such, the surrounding economies look at the NSE as a model securities trading platform. Instances of financial distress should be avoided by all means by setting up proper policies and legislations on listed firms. The National Assembly, the Senate and the National Treasury of Kenya should set up policies and legislation accordingly to protect investors of the listed firms from instances of financial distress that is caused by financial risk.

Studies in other countries have documented that financial risk explains financial distress. Exposure to financial risk of firms need to be constantly assessed and clearly linked to their increasing financial distress. This study recommends that required financial risk levels can be set up for firms by the government and regulators through legislation and policy in order to have a yardstick for measurement mechanisms for firms' efficiencies. Additionally, the NSE directors and the executive committee, including directors of listed firms should serve under performance contracts, such that the NSE and firms can change their management in cases of non-performance and financial distress situations.

Research organizations and bodies should invest more in furthering and enhancing deeper research on areas listed firms. Financial distress has been a challenge with firms listed at NSE and substantial evidence has been documented to that extent. It is regrettable that financial distress and liquidity problems still remain a concern of the listed firms in Kenya. Listed firms in Kenya have or are still experiencing financial distress hence the research organizations, universities and institutions should prioritize areas of further research on listed firms. Enhancing research can be, for instance by supporting students through financing research works/studies, other areas of investigation and corrective measures put in place by relevant bodies/sectors to curb instances of financial distress.

Directors and finance/risk managers of the listed firms in Kenya should be keen to manage their financial risk exposures; especially interest rate risks through diversification of bond maturities or hedging using interest rate derivatives and credit risk management through proper cashflow management. Proper measures to curb instances of financial risk in its various dimensions should be put in place by firms in their specific way of operations. The study recommends continuous

research to be undertaken on the listed firms (firm specific) especially on their changing financial risk levels using other measures and their linkages to financial distress be clearly understood.

Firms outside the NSE should also be investigated in comparatives analyses by researchers and interested parties. This will help the firms intending to list on the NSE to avoid the adverse factors that affect the already listed firms. This will enable proper understanding of firms' operations and also enable proper comparison between firms. Required financial risk levels should also be set up for firms by regulators and through policy in order to have a yardstick for measurement mechanisms for efficiency. Additionally, required financial distress levels should be set up for firms so that to have a yardstick for measurement of firms' inadequacies. Furthermore, the government and regulators of listed firms in Kenya should put in place punitive measures for firms which ignore measures to curb against financial distress.

Limitation and future Research
This study encountered a number of challenges but which, as were hoped, did not have a significant effect on the findings of the study. Cases of missing data arose (for some firms for some periods) posing a limitation of concern. The study overcome this through screening data for completeness before the actual analysis and report on findings. In addition, the study employed unbalanced panel data analysis to mitigate on further missing data. Secondary data used in this study may also be prone to bias and errors since they were historical in nature. This problem was overcome by ensuring that only authentic secondary data from the NSE handbook and authenticated audited financial statements and sites were used. The sites from which data were obtained are the NSE, the Capital Markets Authority (CMA) and the Central Bank of Kenya (CBK). The Nairobi Securities Exchange (NSE), CMA and CBK were anticipated to be reluctant in giving out further information concerning the firms for fear of the information being used against their policies. This limitation was overcome by clearly explaining the purpose of the research and the confidentiality measures to be undertaken to take care of their concerns, in any case, on the use of such data.

Researchers and research bodies should conduct in-depth analyses of other factors outside the regulations. In addition, future studies should incorporate the moderating and mediating impacts of firm specific factors on the relationship between financial risk and financial distress of firms listed at the NSE, Kenya. Existing studies have not attempted to delve in such an analysis. The literature or lack of it touching on financial risk and financial distress including incorporation of other variables as moderators and mediators creates contextual, empirical, conceptual and methodological gaps that still need to be addressed. The government and other organizations should encourage research in these areas by directing funding and other incentives to the areas. The study recommends continuous research to be undertaken on the listed firms (firm specific) especially on their changing financial risk levels using other measures and their linkages to financial distress be clearly understood.

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