

Credit Risk and Financial Distress of Firms listed at the Nairobi Securities Exchange, Kenya

¹Walela Elias, ²Omagwa Job , ³Muathe Stephen

¹ Faculty of Business, Computer Science and Communication studies, St. Paul's University, Kenya, E-mail:

b.walela@yahoo.com

²School of Business, Kenyatta University, Kenya, Email: omagwa.job@ku.ac.ke,

³School of Business, Kenyatta University, Kenya, Email: muathesm@yahoo.com

Abstract

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. 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. Credit 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. Hence, an empirical issue that remains is to determine what effect Credit risk on financial distress of the listed firms. The general objective was to investigate the effect of Credit Risk of firms listed at the Nairobi Securities Exchange, Kenya for the period 2009-2018. This study was based on Wreckers theory of financial distress 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. Data analysis was done using descriptive statistics and inferential statistics using Binary Logistic regression model where SPSS version 22 was applied. The findings indicated that: Credit risk was not statistically significant at 5% significance levels (p -value=0.120). Listed firms in Kenya should be keen to manage their Credit risk exposures in order to avoid cases of financial distress, since they have a positive relationship. The study recommends that required credit risk levels should also be set up for firms by the Capital Markets Authority, regulators and through policy with an aim of having a yardstick for measurement mechanisms for firms' efficiencies.

Keywords: Risk, Credit Risk, Financial Distress, Insolvency, Bankruptcy, Kenya

1.0 Introduction

Distress situations have been observed all over the world across continents hence emphasizing distress as a global problem (Platt & Platt, 2008). When firms are faced with distress situations, the immediate effect is on the firms' operations, in spite of the causes of the distress situations (Pindado, Rodrigues & de la Torre, 2009). It is therefore of vital importance to have an analysis of the effect of factors contributing to distress situations, which is important in reducing or eliminating adverse effects on firms. Factors that contribute to distress situations in firms have been identified and are varied on a wide scale.

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.

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). Credit risk is noted as the most consequential risk especially in cases of financial institutions which deal with lending money (Ogilo, 2012). Such firms and people default in their commitments hence this risk is also termed as default risk. In such situations, the lenders are uncertain of receiving their dues in terms of interest plus the principal given as loan (Mwaurah, 2015). The firm ends up suffering from lower incomes from loan repayments, rise in costs associated with the collection of the loans, low collections from debtors etc. Many firms suffer and may end up in bankruptcy if they ignore credit risk associated with their operations. Studies on credit risk are on the increase due to the fact that the risk has an effect on every financial contract, can lead to a low uptake on investments by firms (Occhino, Filippo, & Pescatori, 2010) and the attention towards the risk has been on an upward trend (Zamore *et al.*, 2018).

An increase or decrease in a firm's debt implies an increase or decrease respectively in the firm's financial leverage. 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.

1.1 Statement of the Problem

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). Of paramount importance in ensuring a stable financial market, a stable society and ultimately a stable economy is the stability of the firms listed at the NSE, Kenya.

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 credit 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 understanding that financial distress and credit risk are some of the risk factors affecting firms at the NSE (Omondi, 2015; Capital Markets Authority, 2018) and that financial distress has been attributed to credit risk by some studies, it remains unclear in the context of listed firms in Kenya.

As much as NSE listed firms have or are still experiencing financial distress, there is limited empirical literature in Kenya touching on the effect of financial risk on financial distress of the firms listed at the NSE. Consequently, this study sought to address the empirical gap. There is a lack of a convergence in literature on the effect of credit risk on financial distress of listed firms. The lack of empirical literature creates conceptual, contextual, empirical and methodological gaps. It is against the backdrop that this study was conducted.

1.3 Objective of the study

The general objective of the study was to assess the effect of credit risk on financial distress of firms listed at the Nairobi Securities Exchange, Kenya.

1.4 Research Hypothesis

This study sought to test the following null hypothesis:

H₀₁: Credit Risk has no significant effect on financial distress of firms listed at the Nairobi Securities Exchange, Kenya.

1.5 Conceptual Framework

To guide this study, the relationship between credit risk and financial risk is presented in the conceptual framework model shown in the Figure below;

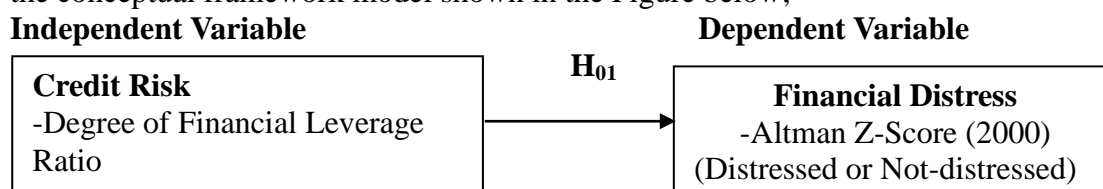


Figure: Conceptual Framework

Source: Researcher (2019)

In this study, credit risk was hypothesized to impact financial distress of NSE listed firms. The independent variable was Credit risk measured using the degree of financial leverage. The dependent variable in the study was financial distress. The dependent variable, financial distress, was measured using the Altman Z-Score model 2000.

2.0 Literature Review

2.1 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.

2.1.1 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.

2.1.2 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.

2.1.3 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).

2.1.4 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.

2.1.5 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).

2.2 Empirical Review

2.2.1 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.

H₀₁: Credit Risk has no significant effect on Financial distress of firms listed at the NSE, Kenya.

2.2.2 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.

H₀₁: Currency Risk has no significant effect on Financial distress of firms listed at the NSE, Kenya.

2.2.3 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.

H₀₁: Interest Rate Risk has no significant effect on Financial distress of firms listed at the NSE, Kenya.

2.2.4 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.

H₀₁: Liquidity Risk has no significant effect on financial distress of firms listed at the NSE, Kenya.

3.0 Research Methodology

Positivism and Social constructivism are the two traditional philosophies that guide social research. This study was intended to be objective and free from external individual influence hence the philosophical foundation that guided this study is positivism. Positivism seeks facts about social phenomena that are observable, objective, neutral and can be predicted without undue influence and little regard to subjectivity of individuals (Saunders *et al.*, 2007). Saunders, Lewis and Thornhill (2009) hold the view that the philosophy choice is influenced by practical considerations. The practical considerations in using positivism in this study were based on the type of investigation (explanatory), purpose of this study (which was to test hypotheses), data collection time frame (limited period and time), analysis involved (quantitative analysis methods) and the events of interest which are external, objective, factual and not dependent on

the researcher. Validity of findings is highly enhanced through positivism given its long and rich tradition historically (Hirschheim, 1985; Nissen, Hirschheim, Fitzgerald, & Wood-Harper, 1985) and as cited in (Musau, 2018).

Explanatory non-experimental and descriptive designs were employed in this study. The designs were the most appropriate in delivering optimal results for this study. Explanatory studies have an emphasis on establishing and explaining causal relationships (Saunders *et al.*, 2007). Explanatory studies aim at obtaining the cause and effect between variables (Robson, 2002; Sekaran & Bougie, 2011) hence was appropriate for this study. Descriptive designs afford a researcher with more information from established groundworks through other basic designs (Musau, 2018). The design guards against bias by the virtue of the researcher cannot manipulate variables since they having no control over the variables. Descriptive designs further enable capturing of the characteristics of a population and enables hypothesis testing (Mugenda & Mudenda, 2003; Cooper & Schindler, 2008) hence was relevant for the study because this study sought to test hypotheses. The descriptive design incorporated the longitudinal and cross-sectional nature of the study data. Additionally, the research designs incorporated a quantitative approach to data collection, analyses and reporting, an approach also employed by Muathe (2010).

3.1 Target Population

The target population was a census of 66 firms quoted at the NSE as at August 2018 (Nairobi Securities Exchange, 2018). Census enabled the collection of the detailed data of every firm under study hence increasing the statistical power and accuracy of the findings.

3.2 Data Analysis and Presentation

Probit, tobit and logistic models are applicable in the case of the dependent variable being dichotomous (Field, 2005 & Muathe, 2010). The dependent variable in the current study was binary (dichotomous) hence the most appropriate and preferred model was logistic. Logistic was preferred because it is simpler to interpret, easier to estimate, it is applicable to broader spheres and is appropriate in detecting the presence or absence of a characteristic under analysis based on a set of independent variables (Muathe, 2010).

Descriptive statistics are employed to summarize and describe data (Muathe, 2010) in addition to helping in understanding the meaning of the analysed data (Kinyua, 2015; Musau, 2018). The descriptive statistics helped summarize and profile the data sets and results were presented using graphs, tables, percentages, frequencies etc. Measures of central tendency which included mean, median, mode etc focus on the average or middle values of the data sets (Saunders *et al.*, 2009). Measures of variability used included standard deviation, variance, skewness and kurtosis and their focus was on the dispersion of data. Inferential statistics particularly the binary logistic regression technique was employed to predict the impact of financial risk on financial distress of the NSE quoted firms.

This study adopted Altman Z-Score model 2000, which is a multivariate model employed to measure the firms' financial health in addition to determining the prospect of financial distress of the firms. MDA models are statistical techniques used to classify an observation into one of the several characteristics they possess, especially in qualitative forms e.g. distressed vs not-distressed, bankrupt and non-bankrupt firms etc (Altman, 2000; Achyarsyah, 2016). MDA models are also essential in avoiding type I and type II errors, an essential feature in avoiding misclassification which can be costly to stakeholders (Maina & Sakwa, 2017). The Altman Z-Score model is precise

for predicting 95% of the sample accurately with the errors being only 6% and 3% respectively. This reassures the significance of MDA models as practical predictive models.

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. The Model is captured below:

$$Z_{it} = 1.2X_{1it} + 1.4X_{2it} + 3.3X_{3it} + 0.6X_{4it} + 1.0X_{5it} \dots\dots\dots 3.2$$

(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 vs not-distressed 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.

3.2.1 Binary Logistic Regression Model

Logistic regression analysis with an aim of determining meaningful stable relationships among sets of data was employed in measuring the impact of financial risk on the financial distress of firms listed at the NSE. 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, Gekara & muturi, 2015; Berger, 2017). Logistic regression analysis studies the interrelationship between a categorical response variable (with only two values) and a set of explanatory variables. Logistic regression is considered by many statisticians as very adaptable and more relevant in modelling varied situations than discriminant analysis since it doesn’t assume normal distribution of predictor variables (Muathe, 2010 & NCSS, 2020).

This study employed the Binary Logistic Regression analysis in finding meaningful relationships between and among credit risk and financial distress of firms listed at the NSE since the dependent variable in this study is binary in nature (Classified firms as Distressed (0) vs Not-Distressed (1)). Binary Logistic Regression outlines an association between a binary outcome (Financial Distress) variable and one or mre independent variables (Credit risk) (Fagerland & Hosmer, 2012). Logistic regression estimates a multiple linear regression function defined as;

$$\text{Logit (p)} = \log \left(\frac{P(Y=1)}{1-(P=1)} \right) = \beta_0 + \beta_1 x_{1t} + \beta_2 x_{2t} + \dots + \beta_p x_{pt} \dots\dots\dots 3.3$$

For i = 1 n

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

$$\text{Logit (p)} = \text{Log} \left(\frac{p(y=1)}{1-(p=1)} \right) = \beta_0 + \beta_1 X_{1it} + \epsilon_{it} \dots\dots\dots 3.4$$

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

ϵ = Error term

The defined variables employed in the study were described, abbreviated, measured and individually hypothesized direction given as in the table below:

Table: Variables Descriptions, Measurements and Hypothesized directions

Type of Variable	Variables	Measurement	Measurement Scale	Hypothesized Direction
Dependent Variable	Financial Distress	Altman's Z-Score (Z) (2000)	Nominal Scale (Distressed vs. Not-Distressed)	Positive / Negative
Independent Variable	Credit Risk	Degree of Financial Leverage (DFL)	Ratio Scale	Positive / Negative

Source: Researcher (2020)

3.2.2 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. The table below indicates the decision criteria that was applied on rejecting versus failing to reject the null hypotheses:

Table: Decision criteria for hypotheses testing

P-Test	Conclusion of the P-Test
If P-Value $\leq \alpha$ (=0.05)	Reject H_0
If P-Value $> \alpha$ (= 0.05)	Fail to reject H_0

Source: Review of literature (2020)

Where:

P - Value = The table value

α = Level of significance (=0.05)

4.0 Results and Discussion

4.1 Descriptive Statistics

The trend for each of the covariates was obtained by plotting the resultant time series against time in establishing the trend of the industry. The summary of the descriptive statistics from the study for both variables for the years 2009 to 2018 are presented in table below.

Table: Descriptive Statistics

	Financial Distress	Credit Risk
N	631	631
Valid		
Missing	0	0
Range	1	5.9067
Minimum	0	-2.9477
Maximum	1	2.9590
Mean Statistic	0.58	0.8056
Mean Std. Error	0.020	0.0283
Std Deviation	0.494	0.7102
Variance	0.244	0.504
Skewness Statistic	-0.332	-1.561
Skewness Std. Error	0.097	0.097
Kurtosis	-1.896	5.907
Kurtosis Std. Error	0.194	0.194

Source: Study Data (2021)

As much as over 70% of the data were obtained from the secondary sources of data collection, some cases of missing data were experienced. Cases of missing data for some firms were encountered and resolved using the Multiple Imputation (MI) technique of filling in missing data. Multiple imputation is a widely adopted statistical method in practice for dealing with missing data. The method removes the potential loss in statistical power and chances of getting biased results (Rezvan, Lee, & Simpson, 2015).

The final data collected comprised of 95.61% of complete data and 4.394% of missing data as indicated in figure above. The missing data were missing completely at random (MCAR). This indicated 631 complete cases and 29 missing cases. Since the missing cases were MCAR and less than 5%, complete case analysis approach was used where the missing cases were omitted and the remaining data was analysed. The results obtained from the analysis in such cases are unbiased estimates and conservative results (Kang, 2013).

Table: Variables Summary

	Missing		Valid N	Mean	Std. Deviation
	N	Percent			
Credit Risk	29	4.4%	631	.805631	.7102031
Financial Distress	29	4.4%	631		

Source: Study Data (2021)

The above results indicate the valid, alongside missing data counts that was used in analysis. The missing data sets were 29 which accounted for 4.4% of the data. The valid data sets were 631 (which accounted for 95.6% of the data).

The trend in Financial Distress levels was also established for the years under study. The results from the analysis are presented in the table below.

4.1.1 Trend in Financial Distress Levels



Figure: Trend in Financial Distress

Source: Study Data (2021)

The observed trend in the distress levels, coded 0 = distressed and 1 = Not-Distressed, showed that most firms were not distressed during the periods 2009 upto 2015. However, the number of distressed firms was on an upward trend from 2015 to almost equal the number of non-distressed firms by the year 2018 (Period 1=Year 2018 period 10=Year 2009). Various factors can be attributed to this, including the policies that were introduced during the period. For example, the capping of interest rates law for banks and financial institutions may have affected the operations of firms in terms of their lending and borrowing potential.

The total number of cases used in analysis of distressed verses not-distressed firms are presented in the bar graph in figure below.

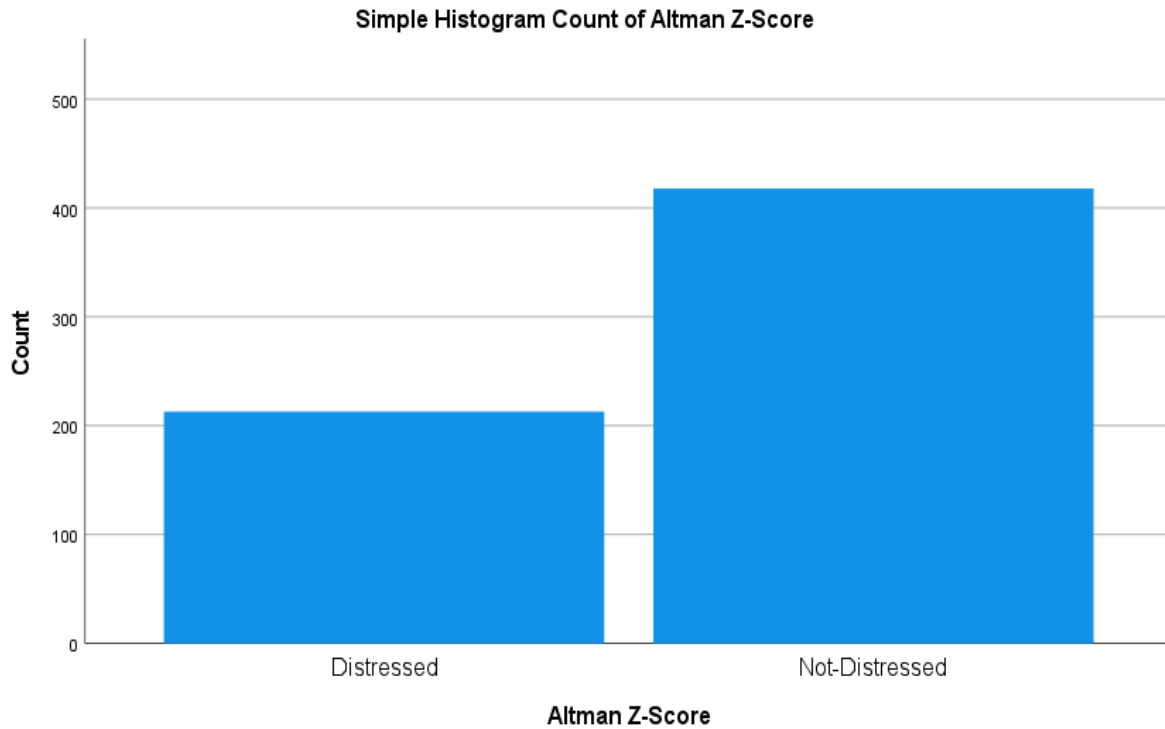


Figure: Cases of analysed Firms (Distressed vs Not-Distressed) at NSE
Source: Study Data (2021)

The results from the figure above indicate that the total number of cases for Not-distressed firms were higher than total cases of distressed firms for the years under study. 418 cases of Not-distressed firms and 213 cases of distressed were analysed over the 10-year period. The total valid cases analysed were 631 (418+213) out of the total possible cases of 660 (66 firms * 10 years = 660). As previously explained in the preceding section, cases of missing firms were varied but mainly due to non-listing, suspension from trading and delisting of some firms under the period of study.

The trends in the independent variable (credit risk) levels of the firms over the period under study was also analysed. The tables and figures below present the results from the analyses and discussions given as to the likelihood of the explanations as to why the observations were as such.

4.1.2 Trend in Credit Risk

The results of the trend analysis of credit risk for firms listed at the NSE for the years between 2009 and 2018 are presented in figure below.



Figure: Histogram of trend in Credit Risk (Measured using DFL)

Source: Study Data (2021)

The credit risk levels were observed to be higher in non-distressed firms over the years under study as compared to the distressed firms (especially in years 2009 – 2015). However, the trend in 2016 – 2018 showed almost equal levels of DFL among all the firms, distressed and not distressed firms. This can be attributed to change of laws especially the enactment of the capping of interest rate cap for financial institutions in Kenya. During the periods after 2014, lending institutions became cautious in lending out finances to firms, individuals and institutions. Firms that were not distressed firms may have failed to take advantage of the policy to enhance their working conditions, leading to an increase in the distressed firms over the period after 2014. The graph of trend of Credit Risk (measured using DFL) over the years was produced as in the Figure below for the observed values, linearized and quadratic functions of the model.

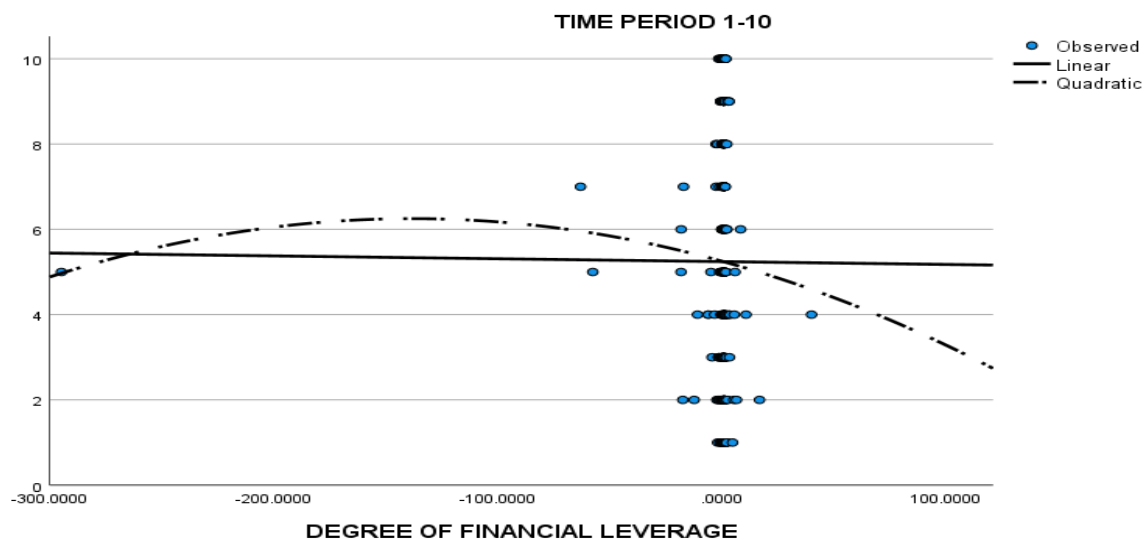


Figure: Graph of trend in Credit Risk

Source: Study Data (2021)

The graph of trend in Credit Risk (measured by DFL) gave a better figurative presentation of the changes in the credit risk levels over the years under study. The trend shows that there was no great dispersion in the credit risk levels between the distressed and non-distressed firms during the period under study. However, greater disparities were noticed between the 5th and 7th years (years 2012-2014) as compared to other years under study.

4.2 Inferential statistics and hypothesis testing

The results of the logit model estimation on the effect of credit risk on financial distress of firms listed at the NSE, Kenya are presented in table below.

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

	β	$t = \beta/S.E.$	Wald	p -value
Credit Risk	0.192	1.5609	2.4140	0.1200
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)

4.2.1 H₀₁: 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 H₀₁: Credit Risk (measured by Degree of financial leverage) has no significant effect on financial distress of firms listed at the NSE, Kenya. The result from the analysis is as presented in the table above where 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 (measured by Degree of Financial Leverage) 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.

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 & Momba (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.

The coefficient of Credit Risk (measured using Degree of financial leverage, DFL) 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.

5.0 Conclusion and recommendations

5.1 Conclusions

This study recognizes from the limited empirical literature that many factors affect the position of firms in terms of their financial distress and financial risk levels. Financial distress in itself may be brought about by various factors as noted in chapter one of this study. With this understanding, this study takes the discussions to a further higher level and it is hoped will enhance mitigation measures from the risks faced and reduce financial distress situations in firms.

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. Undertaking this study which delved on understanding the effect of financial risk on financial distress of firms highlighted some important facts about the listed firms in Kenya, yet the area was largely unresearched. Few studies have been undertaken in the area of financial risk and financial distress and thus, the hope of this paper is that many discussions will be open and widened in the areas.

Regarding the test of hypothesis, credit risk was found to have no significant effect on financial distress of firms listed at the NSE, Kenya. The finding is supported by several empirical studies

while still contradicting other studies. Based on the positive relation between credit risk and financial distress, this study makes a conclusion that as credit risk increases, firms are in danger of plunging in financial distress. Firms will do well if they manage their credit risk levels to reduce or avoid incidences of financial distress. Listed firms in Kenya that are keen in managing their credit risk through proper cashflow management will reduce levels of financial distress that they will be exposed to.

5.2 Recommendations for Policy and Practice

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 National Assembly, The Senate and the National Treasury of Kenya should set up policies and legislation to protect investors of the listed firms from instances of financial distress that is caused by credit risk. 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. 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. This study recommends that required credit 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.

References

- Abuga, J., & Memba, F. (2013). Causes of financial distress; A survey of firms funded by industrial and commercial Development Corporation in Kenya. *Interdisciplinary Journal of Contemporary Research in Business*, 4(12), 15.
- Achyarsyah, P. (2016). The Analysis of the influence of financial distress, debt default, company size and leverage on going concern opinion. *International Journal of Business & Economics Research (IJABER)*, 14(10), 16.
- Almeida, H., & Philippon, T. (2006). *The Risk-Adjusted Cost of Financial Distress*. New York University.
- Altman, E. I. (1968). Financial ratios, discriminant analysis and the prediction of corporate bankruptcy. *Journal of Finance*, 23, 589–609.
- Altman, E. I. (2000). *Predicting Financial Distress of Companies: Revisiting the Z-Score and ZETA® Models*. Stern School of Business, New York University.
- Altman, Edward. (2000). *Predicting Financial Distress of Companies*. Stern School of Business, New York University.
- Atosh, A. M. (2017). *Effect of corporate governance practices on financial distress among listed firms at Nairobi Securities Exchange*. [Research project]. University of Nairobi.
- Aziz, A. M., & Dar, H. A. (2006). Predicting Corporate Bankruptcy: Where We Stand? *Corporate Governance*, 6(1), 18–33.
- Baimwera, B., & Muriuki, A. M. (2014). Analysis of corporate financial distress determinants; A survey of non-financial firms listed in the NSE. *International Journal of Current Business and Social Sciences*, 1(2), 58–80.
- Berger, D. (2017). *Introduction to Binary Logistic Regression and Propensity Score Analysis; Categorical Data Analysis*. Research Gate.
- Boyer, M. M., & Marin, M. (2013). Financial Distress Risk and the Hedging of Foreign Currency Exposure. *Quarterly Journal of Finance*, 03(01), 1350002.
- Chen, D., Miu, P., Qiu, J., & Charupat, N. (2014). *Three Essays on Financial Distress and Corporate Bankruptcy* [Essay]. McMaster University.
- Chenchehene, J., & Mensah, K. (2014). Corporate Survival: Analysis of Financial Distress and Corporate Turnaround of the UK Retail Industry. *International Journal of Liberal Arts and Social Science*, 2(9), 17.
- Cooper, C. R., & Schindler, P. S. (2008). *Business Research Methods*. (10th ed.). McGraw-Hill.
- Fagerland, M. W., & Hosmer, D. W. (2012). A generalized Hosmer–Lemeshow goodness-of-fit test for multinomial logistic regression models. *The Stata Journal*, 12(3), 447–453.
- Field, P. (2005). *Discovering Statistics Using SPSS* (2nd ed.). SAGE Publications, Inc.
- Gatsi, J. G., Gadzo, S. G., & Akoto, R. K. (2013). Degree of Financial and Operating Leverage and Profitability of Insurance Firms in Ghana. *International Business and Management*, 7(2), 57–65.
- Kalckreuth, U. von. (2005). *A “Wreckers theory” of financial distress*. Deutsche Bundesbank.
- Kang, H. (2013). The prevention and handling of the missing data. *Korean Journal of Anaesthesiology*, 64(5), 402 - 406.
- Katambani, A. (2014). *Role of Nairobi Securities Exchanges in the Kenyan economy*. Kenya Economic Forum.
- Kinyua, G. M. (2015). *Relationship between knowledge management and performance of commercial banks in Kenya*. [Thesis]. Kenyatta University.
- Koeh, E., Akuno, N., & Mugo, R. (2018). Prediction of Financial Distress in the light of financial crisis: A case of listed firms in Kenya. *International Journal of Economics, Commerce and Management, United Kingdom*, VI (6), 21.

- Madhushani, I. K. H. H., & Kawshala, B. A. H. (2018). The impact of financial distress on financial performance; Special reference to listed non-banking financial institutions in Sri Lanka. *International Journal of Scientific and Research Publications*, 8(2).
- Mahama, M., & Campus, T. (2015). Assessing the State of Financial Distress in Listed Companies in Ghana: Signs, Sources, Detection and Elimination – A Test of Altman’s Z-Score. *European Journal of Business and Management*, 7(3), 11.
- Maina, F. G., & Sakwa, M. M. (2017). Understanding Financial Distress among Listed Firms in Nairobi Stock Exchange: A Quantitative Approach Using the Z-Score Multi-Discriminant Financial Analysis Model. *Jomo Kenyatta University of Agriculture and Technology*, 16.
- Muathe, S. (2010). *The Determinants of Adoption of Information and Communication Technology by Small and Medium Enterprises within the Health Sector in Nairobi*. [PhD thesis]. Kenyatta University.
- Muriithi, J. (2016). *Effect of Financial Risk on Financial Performance of Commercial Banks in Kenya*. Jomo Kenyatta University of Agriculture and Technology.
- Musau, S. (2018). *Financial inclusion and stability of Commercial Banks in Kenya* [Thesis]. Kenyatta University.
- Mwangi, Muathe, S., & Kosimbei, G. (2014). Relationship between capital structure and performance of non-financial companies listed in the Nairobi Securities Exchange, Kenya. *Global Journal of Contemporary Research in Accounting, Auditing and Business Ethics*, 1(2), 72–90.
- Mwaurah, I. G. (2015). *The determinants of credit risk in commercial banks in Kenya*. 56.
- Myers, S. C. (1984). The Capital Structure Puzzle. *Journal of Finance*, 39(3), 575–592.
- NCSS. (2020). *NCSS Statistical Software*. NCSS.
- Nissen, H. E., Hirschheim, R., Fitzgerald, G., & Wood-Harper, T. (1985). *Acquiring Knowledge of Information Systems—Research in a Methodological Quagmire*. in: *Research Methods in Information Systems (IFIP 8.2 Proceedings)*.
- Nyamboga, T. O., Omwario, B. N., Muriuki, A. M., & Gongera, G. (2014). Determinants of Corporate Financial Distress: Case of Non- Financial Firms Listed in the Nairobi Securities Exchange. *Research Journal of Finance and Accounting*, 5(12), 15.
- Occhino, Filippo, & Pescatori. (2010). *Debt overhang and credit risk in a business cycle model*.
- Ogilo, F. (2012). *The Impact of Credit Risk Management on Financial Performance of Commercial Banks in Kenya*. 3(1), 22–37.
- Omondi, O. G. (2015). Basel Accords on Risk Management: A Survey of Kenya’s Commercial Banks. *Journal of Global Economics*, 3, 164.
- Outecheva, N. (2007). *Corporate Financial Distress: An Empirical Analysis of Distress Risk*. University of St. Gallen Graduate School of Business Administration, Economics, Law and Social Sciences (HSG).
- Pindado J., Rodrigues L., & De La Torre C., (2009). *How Does Financial Distress Affect Small Firms’ Financial Structure?* University of Illinois at Urbana-Champaign’s Academy for Entrepreneurial Leadership Historical Research Reference in Entrepreneurship
- Platt, H., Platt, M., & Chen, G. (1995). Sustainable growth rate of firms in financial distress. *Journal of Economics and Finance*, 19, 147–151.
- Rezvan, H. P., Lee, K. J., & Simpson, A. J. (2015). The rise of multiple imputation: a review of the reporting and implementation of the method in medical research. *BMC Medical Research Methodology* (p. 14). BMC Medical Research Methodology.
- Robson, C. (2002). *Real World Research: A Research for Social Scientist and Practitioners*. Blackwell Publishing.
- Saunders, M. L. (2007). *Research Methods for Business Students*. SAGE Publications Ltd.

- Saunders, M., Lewis, P., & Thornhill, A. (2007). *Research Methods for business students* (3rd ed.). Pearson Education.
- Saunders, M., Lewis, P., & Thornhill, A. (2009). *Research Methods for Business students* (5th ed.). Prentice Hall.
- Schwartz, A. (2005). *A Normative Theory of Business Bankruptcy* [Faculty scholarship series]. Yale Law School, Yale.
- Sekaran, U., & Bougie, R. (2011). *Research Methods for Business: A Skill Building Approach*. (5th ed.). Aggarwal Printing Press.
- Sheikh, S. A., Gekara, D. M., & Muturi, D. W. (2015). Firm Value and Derivatives Use: Evidence from Nairobi Securities Exchange. *IOSR Journal of Economics and Finance (IOSR-JEF)*, 6(6), 18–27.
- Viswanatha, R. (2012). *Analysis of Liquidity, Profitability, Risk and Financial Distress: A Case Study of Dr. Reddy's Laboratories Ltd.* 6(12).
- Zamore, S., Ohene Djan, K., Alon, I., & Hobdari, B. (2018). Credit Risk Research: Review and Agenda. *Emerging Markets Finance and Trade*, 54(4), 811–835.