

# Capital Adequacy Ratios as Predictors of Financial Distress in Kenyan Commercial Banks

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## Abstract

The study sought to investigate the efficacy of capital adequacy ratios as predictors of financial distress in Kenyan commercial banks. The study was based on a positivism research paradigm using a descriptive research design. The population of the study was drawn from 43 commercial banks operating in Kenya over the period 2009-2015. Data were collected using data collection sheets from annual reports of commercial banks. Collected data were analyzed using stepwise logistic regression. Hypothesis testing was done at 0.05 significance levels. The study found that capital adequacy ratios were significant predictors of financial distress in commercial banks in Kenya. Core capital to total deposits: coefficient = 0.249 and P Value = 0.026, core capital to total risk weighted assets: coefficient = -0.419, P Value = 0.007 and total capital to total risk weighted assets: coefficient = 0.320, P Value = 0.017 were all significant predictors of financial distress in commercial banks. The null hypothesis: capital adequacy ratios were significant predictors of financial distress was accepted. The study concluded that capital adequacy ratios were significant predictors of financial distress in commercial banks. Consequently, the study recommended that, there be introduced a continuous industry driven regulatory and reporting structure on capital adequacy for commercial banks.

## Keywords

Financial Distress, Capital Adequacy, Ratios, Core Capital, Total Deposits, Total Capital, Total Risk Weighted Assets

## 1. Introduction

Financial distress can be grouped into three main categories: event-oriented; process-oriented; and technical characterizations. The event oriented definitions look at financial distress as default, failure, or bankruptcy. In this regard, finan-

cial distress is defined as the incapability of a firm to pay its financial responsibilities as they mature (Outecheva, 2007).

According to Liou and Smith (2007), financial distress is a term in the world of corporate finance that denotes a condition when promises to creditors of a company are broken or honored with difficulty. In other occasions, financial distress can lead to bankruptcy. In a more general and basic sense, the concept financial distress is a decline in financial efficiency, which is mostly characterized by a shortage of cash. Based on the knowledge provided by Jayadev (2006), financial distress is a situation where the obligations are totally not met or met with difficulties. The drawback of a firm taking a higher proportion of debt is that it amplifies the risk of financial distress, which is detrimental to the existing holders of equity and debt holders. The extreme form of financial distress is insolvency, which could be very expensive since it leads to incurring legal costs and forcing a firm to sell its assets at distress prices.

A classic works in the area of ratio analysis and bankruptcy classification was performed by Beaver (1966). His univariate analysis of predictors of financial distress was a precursor for the subsequent multivariate analysis. Beaver (1966) established that ratios measuring profitability, liquidity, and solvency prevailed as the most significant indicators. Other scholars have sought to analyze financial distress prediction using varied approaches. These include Altman (1968), Ohlson (1980), Zmijewski (1984) and Zavgren (1985). Others include the Multiple Discriminant analysis, Logistic Regression analysis and Artificial Intelligent Systems (Aziz & Humayon, 2006).

Despite all these models and studies, companies around continue to face financial distress such as Swiss Air, Enron, Philipp Holzmann, Parmalat and Nokia. In Kenya, companies such as Kenya Airways, Uchumi Supermarket, Imperial Bank, Dubai Bank, Kenya Cooperative Creameries and others have faced financial distress. In the Kenyan banking sector, in the 1980's and 1990's, over 9 commercial banks and 20 Non Banking Financial institutions collapsed. In the years April 2015-April 2016, 3 commercial banks collapsed (Chase, Imperial and Dubai Bank) (Carter, 2016).

### 1.1. Statement of the Problem

Despite, the multiplicity of financial distress prediction models and their application in various studies, there exists no consensus on the best model for use in financial distress prediction. However, companies around the world continue to face financial distress. Since majority of the financial distress models were based on the original Beavers 1966 model, could there have been a problem on the choice of variables or indicators used in predicting financial distress and hence the lack of consensus? Furthermore, since the study by Beaver was conducted utilizing companies in USA and those in the Dow Jones Index, could the indicators identified by Beaver be different if companies in developing countries or differing industries have different results? Could the lack of consensus and scar-

city of studies in the Kenyan context have led to a policy monitoring and supervision weakness? These are the questions/gaps the study sought to answer.

The research hypotheses were:

$H_0$ : Capital adequacy ratios are significant predictors of financial distress in Kenyan Commercial Banks

$H_1$ : Capital adequacy ratios are not significant predictors of financial distress in Kenyan Commercial Banks.

## 1.2. Research Objective

To examine the efficacy of financial ratios as predictors of financial distress in commercial banks in Kenya.

## 2. Literature Review

### 2.1. Key Theories

#### 2.1.1. Corporate Bankruptcy under Modigliani and Miller Theory

In their seminal paper of 1958 and 1963 Modigliani and Miller proposed that in perfect and frictionless markets—which occur in the non-existence of taxes, bankruptcy costs, and asymmetric information—the value of the firm is not affected by the financing policy adopted by the company. The theory postulated that the financing decisions of a company do not have any influence on the value of the firm and thus corporate bankruptcy. In other words, it does not matter whether the firm's capital is raised by issuing shared or selling debt. Based on the Modigliani and Miller theory, the measurement of capital adequacy in commercial banks is irrelevant. This is because core capital in the MM theory has no effect on financial distress.

#### 2.1.2. Beavers Model

Beaver (1966) developed a financial distress prediction model based on a set of financial ratios. In the original model of 1966 Beaver utilized only one ratio the Cash flow to total debt ratio to predict financial distress in companies. The Beaver model provides a substantial improvement perspective to financial distress prediction than the Modigliani and Miller theories. It provides for the analysis of a multifacet of ratios in a financial distress prediction model. Similar to the Beaver Model, this study proposed that financial ratios could be used to predict financial distress in commercial banks in Kenya.

#### 2.1.3. Ohlson Model

Ohlson (1980) researched the probabilistic prediction of bankruptcy using Logistic Regression Analysis. Ohlson argued that the use of conditional Logistic Regression Analysis does not require any assumptions regarding the prior probabilities of bankruptcy and distribution of the independent variables. Ohlson identified four main factors that were statistically significant in predicting the probability of failure within one year of failure. These were: the size of the company, a measure of financial structure, a measure of performance and a

measure of current liquidity. This study utilized a probabilistic logistic model to predict financial distress.

#### 2.1.4. Altman Z-Score Model

Altman (1968) developed a multivariate insolvency model based on Multiple Discriminant Analysis (MDA). Altman combined a number of ratios and developed an insolvency prediction model known as the Z-score.

The original Z score model was:

$$Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 0.999X_5$$

where  $X_1$  = Working Capital/Total assets (Liquidity ratio),

$X_2$  = Retained Earnings/Total Assets (Profitability Ratio),

$X_3$  = EBIT/Total Assets (Operating Efficiency Ratio),

$X_4$  = Market Value of Equity/Book Value of Total Liabilities (Market dimension),

$X_5$  = Sales to Total Assets (Total Asset Turnover Ratio).

The Z score product is classified based on the criteria below:

$Z > 2.99$  indicates that the firm is safe,

Between 1.81 and 2.99 that is a grey zone,

$Z < 1.81$  financial distress.

## 2.2. Conceptual Framework

The conceptual framework (Figure 1) presents the relationship between the independent variables (capital adequacy ratios) and the dependent variable (Z score). The independent variables were: core capital to total risk weighted assets ratio, core capital to total deposits ratio and total capital to total risk weighted assets ratio. The dependent variable was the probability of financial distress as measured by Z score.

The conceptual framework proposed that there exists a relationship between the analysis of the independent variables and prediction of financial distress. According to the study, analysis of capital adequacy ratios could significantly lead to prediction of financial distress amongst Kenyan commercial banks.

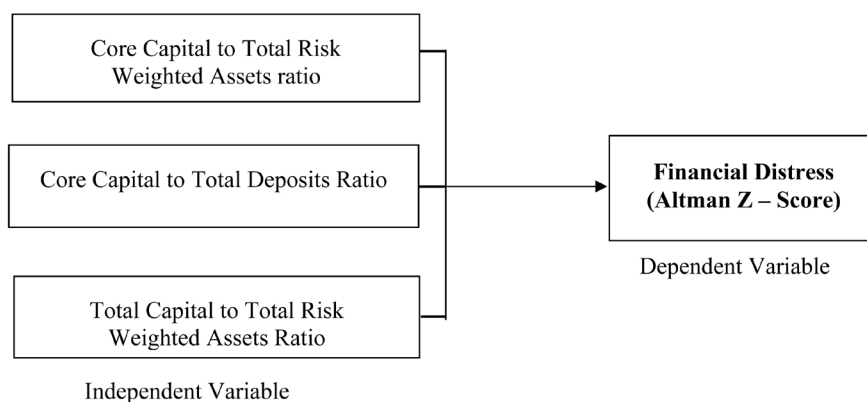


Figure 1. Conceptual framework. Source: Researcher (2018).

### 2.3. Empirical Studies

There a number of past researches which have been carried out to find out the effects of capital outlay on the financial stability of financial institutions. Similar to other financial institutions, banks are financed by both stockholders' equity and debt. Per se, it would be interesting to understand the effects of capital outlay on the financial stability of banks. According to Sudi and Lai (2001), debt restructuring refers to the renegotiation of debts in a company to alter or change the interest rates, the principal repayments, and the timelines for maturity or conversion of the debt into equity in the company. This strategy has been effectively utilized in a number of companies around the world to drive their turn around strategies. In the study by Sudi and Lai (2001), financial restructuring was defined as the reconstruction of the capital structure of the company to reduce the debt burden caused by interest and principal repayments of the company. Financially distressed companies can renegotiate their debt levels or contracts with creditors to turn around their fortunes (Kose, 1993).

The view that more tangible equity capital is needed in banking to suppress the risk-taking appetites of thinly capitalized banks was in vogue in the 1980s, especially in the aftermath of the S&L crisis in the United States. This idea was at the heart of many landmark regulatory reforms, such as the Basel I Capital Accord in 1987, FIRREA (Financial Institutions Reform, Recovery, and Enforcement Act) in 1989, and the FDICIA (FDIC Improvement Act) in 1991. <sup>12</sup> It is also one of the factors that underlies the strong endorsement of significantly higher capital requirements in banking by Taffler and Breton (2001). The second subgroup of Group 3 theories argues that higher capital improves banks' ability to absorb risk, Quality of Assets (QAT) exposes banks to risks, and these risks increase with the amount of QAT provided by the bank. For example, the greater the liquidity created, the greater are the likelihood and severity of losses associated with having to sell illiquid assets to meet customers' liquidity demands (Salehi & Abedini, 2009). The third subgroup of Group 3 theories relies on the idea that the shareholders of better capitalized banks have more to lose from bank failure and are therefore more likely to engage in costly borrower monitoring.

This idea was supported by Wruck (1990), who developed a model in which higher capital provides stronger incentives for banks to monitor their borrowers and there is an interaction between bank capital and borrower capital. Enhanced bank monitoring improves not only the terms of financing and access to bank credit for borrowers, but also their access to nonbank sources of finance because those financiers also benefit from the improvement in borrower credit quality due to the bank's monitoring.

Whereas Ward and Foster (1997) provide a static model, Davydenko (2005) develop a dynamic variant in which bank equity capital not only strengthens the bank's monitoring incentives, but also enhances its survival probability, thereby increasing the value of its relationship loans and creating a positive-feedback effect that further strengthens the bank's incentive to monitor. Taliani (2010)

shows that higher bank capital can help the bank increase its market share. Whereas this literature takes the existence of valuable bank-borrower relationships as a given and asks how bank capital affects the value of these relationships, [Brownbridge \(1998\)](#) develop a theory of how inter-temporal loan contracting can foster the development of enduring relationships. These monitoring-based theories of bank capital structure reinforce the idea that bank capital has a beneficial impact in diminishing bank risk and, hence, enhance financial system stability that the earlier asset-substitution, moral-hazard theories had highlighted.

### **3. Research Methodology**

#### **3.1. Research Design**

A positivism research paradigm was utilized in the study. Positivism was justified for use in the study as it provided for the development and testing of hypothesis. A descriptive research design was used in this study. Descriptive research design was justified for use in the study as it allowed for the collection of data to describe the relationship between financial ratios and financial distress prediction.

#### **3.2. Population and Sampling**

The population of this study was drawn from 43 commercial banks licensed by the Central Bank of Kenya for the period 2009-2015. During this period 3 commercial banks collapsed justifying the length of study.

The sampling frame was equal to the population and totaled 43 commercial banks. A census survey was conducted as the sampling technique since the sampling frame was small and to eliminate the sampling error. The sample size was therefore 43 commercial banks.

#### **3.3. Data Collection and Research Procedures**

Data for the study was collected from the annual reports of commercial banks using a data collection sheet. The data collected was for the capital adequacy ratios: core capital to total risk weighted assets, core capital to total deposits and total capital to total risk weighted assets. This data was collected from the published annual reports of commercial banks. The data was collected for the period 2009-2015. Cronbach Alpha was used to test for reliability the statistic was 0.871.

#### **3.4. Data Analysis**

Descriptive analysis was done using: Mean, Range and standard deviation. Step-wise Logistic Regress was undertaken for relationship analysis. Model testing was done at 0.05 significance levels for the dependent variable (Z score) and independent variables (cash core capital to total risk weighted assets, core capital to total deposits and total capital to total risk weighted assets).

## 4. Results and Findings

### 4.1. General Findings

Thirty six commercial banks out of 43 commercial banks had complete data for use in the study. Some of the banks had incomplete records, others reported at a group level using foreign currencies and some merged during the period and were thus excluded from the study (Table 1).

The average core capital to total deposits ratio for the period was 18.15 which was higher than the 8% regulatory requirement. The core capital to total risks ratio was 19.65 which was greater than the 8% regulatory requirement by the Central Bank of Kenya. The total capital to total risks ratio was 21.06% in comparison to a regulatory requirement of 12% which is an indicator of relative stability in the banking industry. The descriptive statistics are indicative of stability in the banking industry in Kenya. The industry averages are greater than set minimum requirements which indicate that the banking industry is adequately capitalized.

### 4.2. Independent T-Tests

Independent T-tests were carried out using financial distress as the grouping variable. The results are as shown in Table 2 below.

Core capital to total deposits ratio had a mean of 12.84% in distressed firms while that of non-distressed firms was 18.6012%. The corresponding standard deviations were 1.23489 and 8.55962 respectively for each of the two groups. The findings imply that there was a significant difference in the core capital to total

**Table 1.** Descriptive statistics.

	N Statistic	Mean Statistic	Std. Deviation Statistic
Core Capital/Total Deposits	252	18.15	8.38
Core Capital/Total Risks	252	19.65	9.36
Total Capital/Total Risks	252	21.06	9.01
Valid N (listwise)	252		

Source: Researcher (2018).

**Table 2.** Independent T-Tests.

	Distress	N	Mean	Std. Deviation	Std. Error Mean
Core Capital/Total Deposits	1	15	12.8400	1.23489	0.31885
	2	237	18.6012	8.55962	0.55601
Core Capital/Total Risks	1	15	18.7693	11.75320	3.03466
	2	237	19.8392	9.15283	0.59454
Total Capital/Total Risks	1	15	18.6893	14.25005	3.67935
	2	237	21.6397	8.85829	0.57541

Source: Researcher (2018).

deposit ratio for distressed and non-distressed commercial banks. This could point to core capital to total deposits ratio being a key indicator of financial distress in commercial banks.

There were no significant differences between the means of core capital to total risks ratio for distressed and non-distressed commercial banks. While non-distressed commercial banks had a mean statistic of 19.8392, distressed firms had a mean of 18.7693. Since the two means are very close, then this ratio could be a weak indicator of financial distress in commercial banks. The corresponding standard deviations for the two groups were 11.75320 and 9.15283 respectively.

Total capital and total risk ratio had a difference in the means of the two groups. The distressed commercial had a mean of 18.6893 and a standard deviation of 14.25005 while non-distressed firms had a mean of 21.6397 with a standard deviation of 8.85829. The differences in the two groups' means though not large could be termed significant. Nevertheless, it could imply to the ratio being a weak indicator of financial distress in commercial banks. The capital adequacy ratios as discussed in the preceding paragraphs are weak indicators of financial distress in commercial banks. This could be to the fact that they are regulatory statistics that are imposed up by the regulatory. Furthermore, those being capital adequacy ratios may imply that they are not directly related to operational factors such as cash flows which is the largest single cause of financial distress in commercial banks.

### 4.3. Regression Analysis

Logistic regression was utilized to analyze the relationship between capital adequacy ratios and financial distress prediction using the model:

$$P_i = 1 / (1 + \exp\{-(\alpha + \beta_i X_i + \beta_{ii} X_{ii} + \dots + \beta_n X_n)\})$$

where:

$P_i$  = Probability of financial distress for company  $X$

$X_i, X_{ii}$  = the financial ratios

$\beta$  = Coefficient

$\alpha$  = intercept

**Table 3** contains the model summary statistics. It presents the cox & Snell as well as the Nagelkerke R Square statistic which explains variations in the model. The two R Square also referred to as Pseudo R<sup>2</sup> values explain the change in the dependent variable based on the independent variables. In this study therefore, the model variation is between 12% and 33%. This is based on the two R square

**Table 3.** Model summary.

Model Summary			
Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	81.375 <sup>a</sup>	0.120	0.332

Source: Researcher (2018). <sup>a</sup>Estimation terminated at iteration number 12 because parameter estimates changed by less than 0.001.



which are analyzed differently. When using the Cox and Snell R Square the variation in the model is 12% while when using the Nagelkerke R Square the variation is 33%.

### Coefficients in the Model

The coefficients **Table 4** shows the relationship between the independent and dependent variables. The table shows the B coefficients in the model, the SE standard error, the Wald Test, the differential df, the P value and the Standardized coefficients Exp (B). The B Coefficients in the model, the Wald and the P Value provided the most useful information as they indicate the type, relationship and significance of the relationship between the dependent and independent variables.

The core capital to total deposits ratio had a positive correlation to the prediction of financial distress in commercial banks. The coefficient of the variable was 0.249 with a standard error of 0.112, a Wald Statistic of 4.971 with a P value of 0.026. This implies that the relationship between core capital to total deposits ratio was significant at 0.05 significance levels. This indicates that the prediction of financial distress amongst commercial banks was positively improved by the core capital to total deposits ratio. Consequently, the core capital to total deposits ratio is included in the financial prediction model since it is statistically significant.

The core capital to total risk weighted assets ratio had a negative relationship with the prediction of financial distress amongst commercial banks in Kenya. The relationship was  $-0.419$  which was significant at 0.05 significance levels. The Standard error of the variable was 0.156 with a Wald test of 7.232 and a P Value of 0.007. Consequently, the study finds that core capital to total risk weighted assets ratio negatively influenced the prediction of financial distress amongst commercial banks. The ratio is included in the financial distress prediction model since it is statistically significant at 0.05 significance levels.

The total capital to total risk weighted assets ratio had a positive relationship with the prediction of financial distress in commercial banks. The statistic 0.320 with a standard error of 0.135 and a Wald statistic of 5.656 was significant at 0.05 significance levels since its P value was 0.017. Consequently, the study finds

**Table 4.** Model coefficients.

		Variables in the Equation					
		B	S.E.	Wald	df	Sig.	Exp (B)
Step 1 <sup>a</sup>	CCTD	0.249	0.112	4.971	1	0.026	1.282
	CCTR	-0.419	0.156	7.232	1	0.007	0.658
	TCTR	0.320	0.135	5.656	1	0.017	1.377
	Constant	10.174	9.475	1.153	1	0.283	26,204.734

Source: Researcher (2018). <sup>a</sup>Variable(s) entered on step 1: CCTD, CCTR, TCTR.

that the total capital to total risk weighted assets ratio was positive linked to the prediction of financial distress amongst commercial banks in Kenya. As a result, the ratio is included in the financial prediction model since it is statistically significant at 0.05 significance levels.

The findings in the preceding 3 paragraphs shows that the capital adequacy ratios as identified by Basel III guidelines and the Central Bank of Kenya regulations are critical in the prediction of financial distress amongst commercial banks in Kenya. The relationship between the capital adequacy ratios and financial distress prediction is significant for the three variables and thus key in financial distress prediction. The findings in this section prove that the null hypothesis is accepted that capital adequacy/leverage ratios can be used to significantly predict financial distress in commercial banks.

## 5. Discussion of the Findings

Capital adequacy and financial distress are highly correlated according to various researchers. A firm must be adequately capitalized for it to be financially sustainable. While various scholars have measured financial distress using various metrics and ratios, this study utilized the capital adequacy ratios as spelt out in the Basel II regulations and Central Bank of Kenya regulations. The capital adequacy ratios utilized in this study were: core capital to total deposits, core capital to total risk weighted assets and total capital to total risk weighted assets ratio. The study found that all the three capital adequacy ratios were significantly related to financial distress and could be used to predict financial distress in the Kenyan banking sector.

The findings of this study validate the requirements by Basel III regulations on the use of the capital adequacy ratios to foretell and monitor financial distress in the banking industry. The view that more tangible equity capital is needed in banking to suppress the risk-taking appetites of thinly capitalized banks was in vogue in the 1980s, especially in the aftermath of the S&L crisis in the United States.

The findings above underlie the strong endorsement of significantly higher capital requirements in banking by Taffler and Breton (2001). Financial intermediation and banking theories argue that higher capital levels improve banks' ability to absorb risk. Quality of Assets exposes banks to risks, and these risks increase with the amount of quality of assets provided by the bank. For example, the greater the liquidity created, the greater are the likelihood and severity of losses associated with having to sell illiquid assets to meet customers' liquidity demands (Salehi & Abedini, 2009).

As is the case in this study, Ward and Foster (1997) provide a static model while Davydenko (2005), develop a dynamic variant in which bank equity capital not only strengthens the bank's monitoring incentives, but also enhances its survival probability, thereby increasing the value of its relationship loans and creating a positive-feedback effect that further strengthens the bank's incentive to

monitor capital adequacy ratios. Taliani (2010) shows that higher bank capital can help the bank increase its market share. These ties in with the findings of this study which shows that as the level of capital in the bank increases, the probability of the firm going into financial distress diminishes. When risks of financial distress are lower, then the market value of the firm increases.

## 6. Conclusion

Capital adequacy ratios are keys to predicting financial distress. Core capital to total deposits and core capital to total risk weighted assets have a positive relationship with financial distress while total capital to total risk weighted assets had a negative relationship with financial distress prediction. Consequently, this study concludes that the capital adequacy ratios share a significant relationship with financial distress in commercial banks. The higher the capital adequacy ratios are, the lower the probability of financial distress prediction is.

In the prediction of financial distress, capital adequacy ratios are the most important class of ratios that can be effectively used to predict financial distress in commercial banks. In fact, annual financial performance data and manager's perception point to the fact that capital adequacy ratios are critical in the prediction of financial distress in commercial banks.

## 7. Recommendations

The study recommended that commercial banks and banking regulators take keen interest on capital adequacy in the banking sector as it has a high significant effect on financial distress. Furthermore, the use of capital adequacy ratios as financial distress prediction tools could help in predicting, diagnosing, identifying and putting in place corrective measures to correct cases of financial distress amongst commercial banks.

Since capital adequacy ratios are the single most important financial distress predictors, managers and commercial banks must put in place measures, systems and action plans. In fact, this study recommends that as a self-driven regulatory measure, the banking sector can adopt or establish an automated system that tracks and reports capital adequacy in commercial banks with the aim of helping each other in cases where capital adequacy in any bank is a challenge.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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