African Journal of Management and Administration, Volume 4, Number 3, 2011
Copyright©2011 ISSN: 2141-0143 Devon Science Company

PREDICTING BANKS FAILURE IN NIGERIA: A TEST OF ALTMAN'S Z-SCORE MODEL

Ben-Caleb, Egbide
Department of Accounting
School of Business, College of Development Studies, Covenant University, Ota, Ogun State, Nigeria

ABSTRACT

Banks represent the nerve centre of any modern economy, and its failure could induce a collapse of the payments system and cause severe dislocation of the real sector among others. The recent credit crises and near collapse of one-third of commercial banks in Nigeria has agitated the minds of people on the possibility of predicting the potential of their failure. This paper was set out to test the validity of the Altman's Z-score model in predicting the potential of failure of Nigerian banks. Z-score multivariate model and the t-statistics were used to analyse eight commercial banks' data. The result provided us with evidence of some level of validity of the model, but not sufficient to conclude that the failure potentials of banks in Nigeria can be accurately predicted by the Z-score model. However, the result reveals that Z score could portend a warning signal against reckless investment decision.

Keywords: Potential of Failure, Nigerian Banks, Altman Z-score Model

Introduction

The increasing incidences of business failures and corporate distresses are issues of universal concern. Its impact exacerbated by the present global economic melt down, had taken it toll on almost every aspect of our society's However, the financial sector appear to be worst hit, as a large number of them around the world have either been taken over or merged with other financial institutions , nationalized by government through bail-outs, declared insolvent or liquidated outright (Ebereonwu, 2009). In the US for instance, Ebereonwu (2009) reported that between February 2007 and February 2009 about 42 banks were bankrupt and received by the Federal Deposit Insurance Corporation (FDIC). The situation had been worst in the developing countries, most of which are consumer nations.

In Nigeria, the financial sector had also paid heavily for this global slow-down. The recent burst of credit crises in the banking industry is evident. Of the 24 banks in the country 8 banks have been found to be at the verge of distress but for the intervention of the CBN which resulted in the replacement of their CEOs and the injection of about N620 billion to salvage them from failing. Some expert have attributed the crises to be the consequences of allowing a distorted macroeconomic environment which encourages trading in money as opposed to lending for production in agriculture and manufacturing to emerge, while others consider the crises to be caused by internal fraud which have depleted shareholders funds. All stakeholders are now trading blames, from the management of the banks for poor risk management, the regulators for failing in their supervisory role and to the accountants and auditors for either cooking the books or failing to report cooked books.

The question then is, is it possible to predict a company's distress one or two years in advance? If yes, why had investors suffer so many losses from investing in these banks unawares? Are their advisers not aware of any distress prediction models? Or do the models they know not apply in Nigeria? These are some of the many questions that agitate the minds of the banking public.

This paper therefore, set out to test the applicability and validity of Altman Z-Score Model on Nigeria banks. It should be noted that the Altman's Z-score is one of the best known model for predicting corporate financial distress, and its validity had been confirmed in both the developed and the emerging economies (Altman, 1968, 1983, 1993 in Samarakoon & Hasan, 1998; Altman, Hatzell & Peck, 1995 in Samarakoon & Hasan 1998). The main trust of this paper is to find out if the Z-Score Model could reveal any indication of distress one or two years earlier.

In order to effectively address the research problem identified in this study, the paper will test two principal hypotheses stated in their null form as follows:

I. Altman Z-Score model can not accurately predict bank failures in Nigeria
II. There is no significant difference between the Troubled banks and the cleared banks in Nigeria

It is believed that the findings of this paper will activate the minds of investors, analysts, advisers, regulators and the banking public to apply distress prediction models before making investment decisions.

Corresponding author: Ben-Caleb, Egbide, bencaleb1@yahoo.com, Tel: 08036997782

2.0 Literature Review

2.1 History of Bank Distress in Nigeria

Corporate failures are not new to humanity, but the inherent consequences of failures are always devastating. For instance, the failure of the South Sea Company and its subsidiaries in 1720 left incurable wounds in the lives of thousand of shareholders precipitated a financial catastrophe in London and triggered financial disasters in Paris and Amsterdam (Orogun, 2009). In the same vein, the collapse of the Bank of Credit and Commerce International (BCCI) was tragic, as it was credited with the biggest fraud in banking history by the Financial Times of London, with its balance sheet composed of a large chunk of rotten items including fictitious and non-performing loans (Orogun, 2009). More so, the decade of 1930s saw about 9000 banks failed in Nebraska alone with investors loosing about $140 billion to bank failures (Ganzel, 2003). Since then the trend of bank failures have remained unabated forcing investors to live in perpetual panic and in anticipation of banking crises with the concomitant effects on the stability of the banking sector as well as the eroding the confidence of public in the sector.

Nigeria has also had her own share of bank distress from the inception of modern banking in the 19 century. Between 1930 when the first bank failures occurred to 1959 when the Central Bank of Nigeria (CBN) came into existence, 21 banks failed. In 1960, about 3 banks failed after which Nigeria was spared more bank failures until 1989 when failures became more frequent. The failures of the pre 1990s were largely and acceptably blamed on inadequate regulatory framework, with mismanagement of assets and lack of adequate capital forming the adjoin causes (Ogunleye, 2002; Olaniyi, 2006). In order to address the issue of regulatory framework, more regulations were brought to existence in the early 1990s such as; Banks and other Financial Institutions Decree (BOFID) of 1991, Prudential Guidelines on asset classification and Provision for loan losses as well as Failed Banks and other Financial Malpractices' Acts of 1994(Olaniyi, 2007). This did not seem to have tamed the trend of bank failures in the 1990s, hence more banks failed. In fact mass distresses were recorded in the 1990s with the highest cases of distresses occurring in the 1995 and 1996 years (60 banks), leading to the ultimate liquidation of 26 banks on January 16, 1996 (Sanusi, 2004). Between 1995 and 1999 the number of banks reduced from 115 to 89 due to distresses.

The failures of this era were majorly attributed to inadequate capital base, fraudulent-self-serving and corrupt practices of the owners and managers, meddlesome interference of board members in the day to day running of the institutions, regulatory laxity, policy instability and global financial developments (Orogun, 2009). The number of banks in the country fluctuates between 88 and 90 until 2006 when Soludo's banking reforms of N25b minimum capital based was fully implemented which eventually reduced the number of banks from 89 to 25 (Onaolapo, 2008). The incremental movement of the minimum capital based from N2billion naira to N25billion was expected to finally nailed the challenge of inadequate capital among Nigerian banks, transform Nigerian banks into mega banks that can compete favorably in the global financial market place, with innovative products thereby generate a high return for stakeholders as well as curtail the menace of fraud and distresses of the pre consolidation era (Oviemuno 2006).

To what extend did the expectations of the post consolidation era come true? The recent burst of credit crises in the banking industry seems to be providing negative answers to this question. It should be recall that between August and September 2009 the Central Bank of Nigeria intervened in the banking sector by removing and replacement of the chief executives and executive directors of eight banks and injected about N620 billion into the affected banks as a way of salvaging the banks from collapse. The affected banks include; Intercontinental Bank Plc, Oceanic Bank Plc, Union Bank Plc, Afri Bank Plc, and Fin Bank Plc. Others are Bank PHB, Spring Bank Plc and Equatorial Trust Bank Plc.

Some expert have attributed the crises to be the consequences of allowing a distorted macroeconomic environment which encourages trading in money as opposed to lending for production in agriculture and manufacturing to emerge, while others consider the crises to be cause by internal fraud which have depleted shareholders funds. All stakeholders are now trading blames, from the management of the banks for poor risk management, the regulators for failing in their supervisory role and to the accountants and auditors for either cooking the books or failing to report cooked books. (Amuchie, 2009). According to the CBN governor Mr Lamido Sanusi, the banks needed fresh funds because of their huge exposure to the capital market and huge non-performing loans that contributed to the liquidity problems in the affected banks

A lot of questions agitate the mind of the mind of banking public; such as: Is it not possible to predict a bank failure earlier? Are our regulators and financial analysts' ignorant of such techniques? Or did they see the warning signals and look elsewhere? According to Eidleman (1995), "A company's chances of survival can be predicted with the use of financial-statement analysis". It is one of such model for predicting failures that that this studies attempt

2.2 Altman Z-score distress prediction model

The Altman Z-Score is one of the best known models for predicting corporate distress (Samarakoon & Hasan. 1998). It was developed by Professor Edward Altman in 1968 to predict the likelihood of a company going bankrupt within the next two years. Within the US and some emerging economies the Z-score model has been found to have a very high degree of accuracy in predicting corporate financial distress (Altman, Hatzell and Peck, 1995 in Samarakoon & Hasan. 1998).

In developing his model professor Altman utilized a sample of 66 companies made up of 33 bankrupt companies and 33 non-bankrupts companies over the period 1946 to 1964. He computed their balance sheets and income statements ratios and then settled for five variables on the basis that they did the best overall job in predicting bankruptcy (Abdullah, Halim, Ahmad & Rus, 2008). These variable or ratios were working capital to total assets, retained earnings to total assets, earnings before interest and taxes to total assets, market value of equity to book value of total debt and sales to total assets. Weights were then assigned to the ratios to obtain the Z-score.

Z-Score (original Model): $Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 1.0X_5$

Where;

X_1 = working capital/total assets
X_2 = retained earnings/total assets
X_3 = earnings before interest and taxes/total assets
X_4 = market value of equity/book value of total liabilities
X_5 = sales/ total assets

Based on this original model, a Z-score below 1.8 means bankruptcy is likely within two years; a Z-score between 1.8 and 2.99 is a gray area or zone of ignorance; and a Z-score above 2.99 means there is little likelihood of bankruptcy within the next two years (Abdullah, et al 2008).

A revision of the conventional Z-score model gave rise to two variants of it, namely; the private company model and the non-manufacturing company model. These variants and their cut off scores are as shown below;

Private Firms Model. If a firm's stock is not publicly traded, it will be impossible to calculate the market value of such a firm which is used to obtain the X_4 term (Market Value of Equity/Book Value of Debt). Hence, market value of equity is replaced with the book value of equity to obtain X_{4*} term (book value of equity/ book value of debt). The weights are also adjusted as shown below;

Private Firm Model: $\mathbf{Z' = 0.717X_1 + 0.847X_2 + 3.107X_3 + 0.420X_{4*} + 0.998X_5}$

The predetermined cut-offs for the Z' score are as follows: Bankrupt less than 1.23; Zone of ignorance 1.23-2.90; Non-bankrupt greater than 2.90

Non-manufacturing Firms: The X_5 (Sales/Total Assets) ratio is believed to vary significantly by industry. Manufacturing companies because of the capital intensive nature of their business are likely to have a far lower assets turnover ratio than merchandising and service firms, and hence a lower Z-score. The model is thus likely to under predict certain sorts of bankruptcy. To correct for this potential defect, Altman recommended the following correction that eliminates the X_5 ratio:

Non-Manufacturing Model: $\mathbf{Z'' = 6.56X_1 + 3.26X_2 + 6.72X_3 + 1.05X_4}$

The predetermined cutoffs for the Z'' score are as follows: Bankrupt less than1.1; Zone of ignorance 1.1-2.6; Non-bankrupt greater than 2.6.

Altman Z-score has been widely used either as a single predictor model or in conjunction with other model to predict corporate financial distress. According to Eidlemen (1995), "Altman's Z score is the tried and tested formula for bankruptcy prediction. It has been demonstrated to be quite reliable in a variety of contexts and countries". He however warn that an inappropriate used of Z-score might cause an improper classification to occur. For example the Altman Z-score model is not appropriate for Small Firms with assets less than $1 million.

3.0 METHODOLOGY

In this paper we examine the predictable ability of the Altman Z-score model (non-manufacturing variant) on Nigerian banks. Eight banks form our sample size from a population of 24 banks. Although our sample technique was judgmental, it was however informed by the recent examination of banks by CBN, were 8

banks were said to be at the verge of distress while others were cleared. Data were extracted from the annual reports and accounts of four troubled banks (TRBANKS) and four cleared banks (CLBANKS) for two years each (2007 & 2008), from were the Z'' score were computed, to see if on the bases of the Z'' score, there is any indication of distress a year or two prior to the CBN action.

More so, a t-statistics was computed using the Z-scores of TRBANKS and the CLBANKS to find out if there is any statistically significant difference between the Z-scores of the two groups of banks.

3.1 Variables Specification

This paper adopted the Z''-score or the non-manufacturing model in analyzing the data. It is re-stated here under as follows;

$$Z'' = 6.56X_1 + 3.26X_2 + 6.72X_3 + 1.05X_4$$

Were

X_1 = working capital/total assets
X_2 = retained earnings/total assets
X_3 = earnings before interest and taxes/total assets
X_4 = market value of equity/book value of total liabilities

Decision Criteria: The cut-off points for Z" following Altman's classification was adopted in this paper. According to Altman, a company is Safe if it has a Z" score greater than 2.60; a Z" score of between 1.10 and 2.60 inclusive indicate that the company is gray or in the zone of ignorance; a company is said to be distress if it's Z" score is less than 1.10.

4.0 Data Presentation and Analyses

In this section, the data used in study are presented, analyses and discussed. The hypotheses formulated were also tested in this section.

Table 4.1: Z- Score for TROUBLED BANKS 2007

		WC/TA	RE/TA	EBIT/TA	MVE/BVTL	Z"-SCORE
UBN	2007	0.115523	0.027118	0.024718	0.794252	1.846303
ICB	2007	0.204047	0.015887	0.032326	0.857634	2.50809
AFRI	2007	0.098822	0.044242	0.037916	1.008528	2.10625
FIN	2007	-0.021	-0.08621	0.017848	0.809509	0.551128

Table 4.2: Z- Score for CLEARED BANKS 2007

Banks	Year	WC/TA	RE/TA	EBIT/TA	MVE/BVTL	Z"-SCORE
FBN	2007	0.108276	0.03775	0.028965	0.683088	1.745248
GTB	2007	0.179247	0.046075	0.032088	0.64288	2.216719
UBA	2007	0.0923	0.026104	0.025958	0.465958	1.354285
ZENITH	2007	0.112448	0.027351	0.026347	0.535997	1.566669

The result from table 4.1 and 4.2 indicate that all the banks sampled except FIN bank were in the zone of ignorance or grey area (weak) in 2007 as evident in their Z" score which range between 1.3 and 2.5. However, FIN bank has a Z" score of 0.55 which falls in the distress arena. The result show that while none of the banks is in sound health as at this date, only FIN bank shows possibility of failing in the next two years on the basis of their Z score rating.

Similarly, the Z" scores of both the troubled banks (table 4.3) and the cleared banks (table 4.4) a year ago (2008) shows that only First bank with a Z" score of 2.78 was healthy and has no possibility of failing two years later. Fin Bank situation worsen in 2008 as its Z" score deteriorated from 0.55 to -0.15 further confirming the high possibility of the bank going distress. The other banks considered retained their grey position in 2008. Indicating weakness but which is not sufficient to predict failure two years to come

Table 4.3: Z-Score for TROUBLED BANKS 2008

		WC/TA	RE/TA	EBIT/TA	MVE/BVTL	Z"-SCORE
UBN	2008	0.093874	0.029707	0.032793	0.22118	1.16527
ICB	2008	0.108979	0.015036	0.032162	0.204412	1.194682
AFRI	2008	0.067726	0.036265	0.036822	0.195839	1.015584
FIN	2008	-0.02469	-0.03369	0.002499	0.099367	-0.15063

Table 4.4: Z- Score for CLEARED BANKS 2008

Banks	Year	WC/TA	RE/TA	EBIT/TA	MVE/BVTL	Z"-SCORE
FBN	2008	0.291821	0.034505	0.032622	0.508564	2.780046
GTB	2008	0.258416	0.048937	0.037882	0.232361	2.353291
UBA	2008	0.072558	0.035699	0.035943	0.170247	1.012658
ZENITH	2008	0.193399	0.03241	0.029126	0.274545	1.858348

However, a juxtaposition of the revelations from the Z" score rating and the reality of the banking sector recent burst shows some contradictions. For instance, the four banks in our Troubled Banks group are banks that were adjudged to be at the verge of failing and for which their Managing Directors and Executive Directors have been replaced by the Central Bank of Nigeria. Yet only FIN bank Z" score reveals the potential of failure. Also, the Z" score of the banks cleared by CBN could not accurately revealed their soundness, except for FBN whose Z score indicated safety 2008.

The implication of this result is that Altman's Z" score model could not accurately predict the potentials of failure of sound banks and banks in the zone of ignorance. It however, predicts accurately the failure potentials of banks in the distress arena.

4.2 Hypotheses testing

This paper was anchored on two principal hypotheses which were subjected to empirical test in this section. First, we post the proposition that that Altman's Z-Score model can not accurately predict bank failures in Nigeria. From the results in table 4.1 – 4.4, the Z" scores of both the troubled banks and the cleared banks for the two years considered, the model could only predict accurately the failure potential of one bank that actually 'failed', representing about 25% of the troubled banks sampled. Similarly only First Bank health status as predicted by the model a year ago reflected the reality as revealed by the Central Bank of Nigeria (CBN). This also represents 25% of the cleared banks sampled. On the bases of this seeming contradiction, it will be unsafe to reject the first hypothesis, hence we retain it.

This decision portends that the near failure of the troubled Banks in Nigeria could be due to other factors that the models could not capture and which may be non financial. This result relate in part to the conclusion reached by Olaniyi (2007) that the bankruptcy model is only capable of accurately predicting the failure status of unsound banks but incapable of accurately predicting the failure potential of sound and healthy banks. However this is an improvement of Olaniyi's study since the sample of the failed banks and cleared banks was increase from 1 to 4 each. Besides, Olaniyi (2007) used the manufacturing company's version of Z score model to analyse the banks which was not appropriate.

The second hypothesis in this paper was that "there is no significant difference between the troubled banks and the cleared banks in Nigeria". Without prejudice to the result and discussion of the first hypothesis, we seek a statistical judgement as to whether the Z" score of the troubled banks and the Z" score of the cleared bank are different.

A T- test result in table 4.5 shows a calculated t-statistic of -1.65 which is not significant at 1%, 5% and even 10% levels of significant as its P-value of 0.143. More so, since the calculated value of P is less that the critical or tabulated value of t (2.36), we retain the null hypothesis that the Z" score of the troubled banks (TRBDBANKS) is not statistically significantly different from the Z"-score of the cleared banks (CLDBANKS).

The result of hypothesis two corroborated effectively with the result in hypothesis one, in agreeing to the fact that Altman Z"-model is not capable of predicting precisely the failure potentials of banks.

Table 4.5: t-Test: Paired Two Sample for Means

	Z"-SCORES FOR TRBDBANKS	*Z"-SCORES FOR CLDBANKS*
Mean	1.279584609	1.860907803
Variance	0.739986153	0.327144789
Observations	8	8
Pearson Correlation	0.071956251	
Hypothesized Mean Difference	0	
Df	7	
t Stat	-1.647261348	
P(T<=t) one-tail	0.071748413	
t Critical one-tail	1.894578604	
P(T<=t) two-tail	0.143496825	
t Critical two-tail	2.364624251	

5.0 Conclusion and Recommendation

5.1 CONCLUSION

Bank distresses/failures are not new, but the debilitating micro and macro impacts are of universal concern and could be better imagined than experience. This is because banks represent the nerve centre of any modern economy, lubricating the engine of growth of the entire economic system (Olaniyi, 2007). Therefore, understanding the potential for corporate distress becomes paramount among stake holders, as failure will undermine public confidence in the system, and force a sudden contraction of the money supply, curtail savings and investment, induce a collapse of the payments system and cause severe dislocation of the real sector. (Sanusi, 2004).

The near collapse of the banking sector in Nigeria in the 3rd quarter of 2009 had left many depositor and investors licking their wound, eroded the confident of the banking public, left the economy worse off and gasping for breath, but for CBN remedial action.

This paper contributes to the literature by applying the well-known Prof Altman Z-Score distress prediction model (Non-manufacturing variant) to the Nigerian banking sector. The result provides us with evidence of some level of validity of the model, but not sufficient to conclude that the failure potentials of banks in Nigeria can be accurately predicted by the Z-score model. The result also shows that the financials of the banks CBN cleared and the banks said to be at the verge of distress for which their CEOs were replaced were not different statistically, the implication is that the yardstick adopted by CBN in adjudging a bank healthy or sick would have been fundamentally non-financial.

However, as Olaniyi (2007) pointed out, the warning signal provided by the model result is capable of ameliorating unguided investment decision either by the banking public or by the bank itself as a way of reducing the effect of imminent collapse of such banks.

5.2 Recommendations

On the basis of the above findings, the paper made the following recommendations;

i. Investment analysts/consultants should always carry out holistic analyses of both the financial and non financial factors that affect banks survival. This will ensure that the risk of loss to clients due to failure is mitigated.

ii. Investing public should always consult experts for financial and investment advise unless they knowledgeable enough to do the analyses themselves. This will reduce the crises of loss due to bank failure.

iii. Banks should conduct regular analyses of all factors that affect their survival, using appropriate failure prediction techniques including Z-Score Model. This will enable them discover distress signals on time and to put remedial measures in place to avert failure.

iv. Further studies on this topic, a more elaborate study of this model could be carried out probably using all the 24 commercial banks operating in Nigeria.

v. Besides, a comparative study of Z-score model, Logit model Regression model Neural Network (Nguyen, 2005) etc could also be attempted to find out the predictable power of those model in the Nigeria context.

REFERENCES

Abdullah, N.D.H, Halim, A., Ahmad, H. & . Rus R. M. (2008).Predicting Corporate Failure of Malaysia Listed Companies: Comparing Multiple Discriminant Analysis, Logistic Regression and the Hazard Model. International Research Journal of Finance and Economics; issue 15 Retrieved on 23/10/2009 from http://www.eurojournals.com/finance.htm

Amuchie, M. (2009). Who Saw the Bank Crises Coming? Retrieved on 16/10/2009 from www.businessdayonline.com/index.php?

Ebereonwu, E (2009). Global Economic Melt Down: Concluding Part. Retrieved on 20/10/2009from http://www.ng.total.com/media/pdf/2009/globaleconomicmeltdown-part2.pdf

Eidleman, G.J (1995). Z-Score a Guide to Failure Prediction (Business Failure) (Auditing)

Ganzel, B. (2003). Farming in the 1930: Bank Failures. Retrieved on 08/10/2009 from http://www.livinghistoryfarm.org/farminginthe30s/money_08.html

Jesswein, K.R. (2009). Bank Failure Models: A Preliminary Examination of the Texas Ratio. Proceedings for the Academy of Banking. Retrieved on the 08/10/2009 from http://sbaer.uca.edu/research/allied/2009-neworleans/abs/02.pdf

Nguyen, H.G. (2005) USING Neural Network in Predicting Corporate Failure. *Journal of Social Sciences* 1(4)

Ogunleye, G.A. (2002). Deposit Insurance Scheme in Nigeria: Problem and Prospects. Paper presented at the First Annual Conference of International Association of Deposit Insurers (IADI), Basel Switzerland. Retrieved on 20/10/2009 from http://www.ndic-ng.com/pdf/papodisinig.pdf

Olaniyi, T.A (2006). Predicting the Potential of Failures in the Nigerian Banking Sector: A Comparative Analysis of First Bank Plc and Trade Bank Plc. *Babcock Journal of Management and Social Sciences* vol 6(1) pp 64-73

Onaolapo, A.A (2008). Implications of Capital Regulation on Bank Financial Health and Nigeria Economic Growth 1990-2006. *Journal of Economic Theory* 2 (3) 112-117

Orogun, W. (2009). Bank Distress in History. Story from Modern Ghana News. Retrieved on 03/09/2009 from http://www.modernghana.com/news/233487/1/bank-distress-in-history.html

Ovienmuno A.O. (2006) Banking Consolidation in Nigeria and the Strategies For Generating Better Returns. Retrieved on 23/10/2009 from http://searchwarp.com/swa75082.htm

Samarakoon, L.P. Hasan, T (1998). Altman's Z-Score Models of Predicting Corporate Distress: Evidence from the Emerging Sri Lankan Stock Market. Retrieved on 23/10/2009 from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1395229

Sanusi, J.O. (2004). Keynote Address By Chief (Dr.) J. O. Sanusi, (Con) Governor, Central Bank Of Nigeria, At The Fifth Finance Correspondents Seminar, Held At The Imo Concorde Hotel, Owerri, Imo State, From 26th - 28th January, 2004

DEV-2010-236/C. E. Morgan/E-Mail: devonjournal@yahoo.com/FIRB