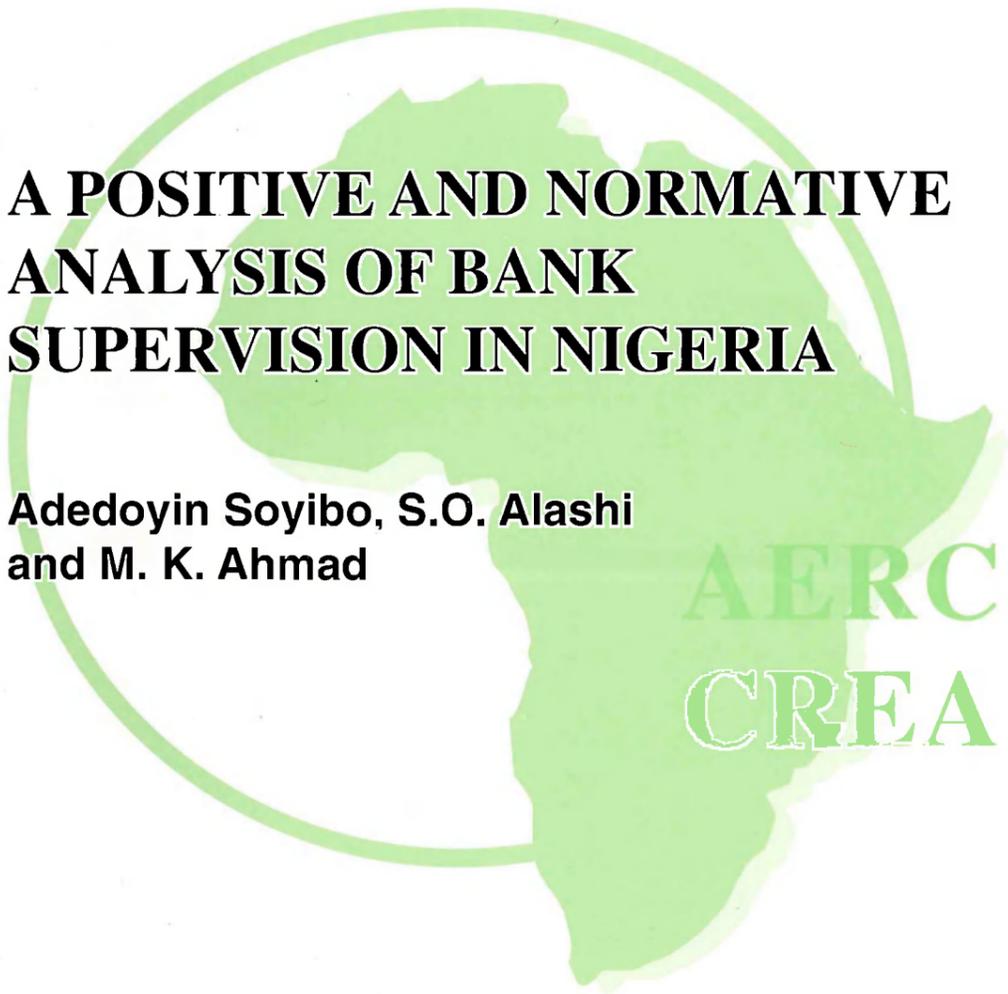


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**A POSITIVE AND NORMATIVE
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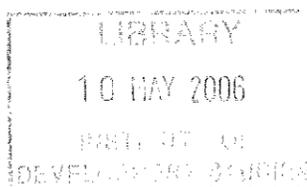
**Adedoyin Soyibo, S.O. Alashi
and M. K. Ahmad**

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AFRICAN ECONOMIC RESEARCH CONSORTIUM

CONSORTIUM POUR LA RECHERCHE ECONOMIQUE EN AFRIQUE

**A positive and normative
analysis of bank supervision in
Nigeria**



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Table of contents

List of tables

Acknowledgements

Abstract

1.	Introduction	1
	The problem	1
	Objectives of the study	2
2.	Literature review and analytical framework	3
	Bank regulation and supervision	3
	Causes of bank failure	5
	Predicting bank failure	6
	The analytical framework	9
3.	The extent of bank regulation and supervision in Nigeria	13
	The process of bank supervision	14
	Current early warning system for identifying distress	15
	A critique of the current EWS	18
4.	Characteristics of bank distress in Nigeria	21
5.	Determinants of bank condition	28
6.	Constructing early warning models of bank failure	31
	Modified CAMEL-based composite rating scheme	31
	Logit-based EWS	32
7.	Effectiveness of bank supervision	35
8.	Concluding remarks	38
	Notes	39
	References	40

List of tables

1.	Weights of CAMEL factors in use in Nigeria	15
2.	Bank classification based on the composite rating scheme	17
3.	Some characteristics of holding action banks (HABs), 1990–1996	22
4.	Selected performance measures, 1992–1995 (percent)	24
5.	Selected performance measures, 1993 (percent)	25
6.	Selected performance measures, 1994 (percent)	26
7.	Selected performance measures, 1995 (percent)	27
8.	Determinants of bank failure, cross-sectional data	29
9.	Determinants of bank failure, panel data	30
10.	Revised weights of CAMEL factors	32
11.	Predictive power of the composite rating schemes (percent of correct prediction)	32
12.	Logit-based early warning model candidates	33
13.	Predictive power of candidate logit-based EWS, 1996 (percent of correct prediction)	34

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Abstract

Financial liberalization, apart from increasing the number and varieties of financial institutions, also brought about increased distress in the financial system. As at 1995, there were reports that 60 out of 115 surviving banks (52.2%) were distressed. A very high proportion of non-bank financial institutions was also distressed. Because of the ensuing competition resulting from financial liberalization, the use of non-price strategies to attract customers became prominent. This led to a lot of adverse selection and incentive problems culminating in a high rate of non-performing loans, default and insolvency within the financial system.

The need to have better understanding of the nature and determinants of the supervisory and regulatory agencies' decisions in the early identification of non-healthy from healthy banks, therefore, becomes quite useful. This constitutes the main focus of this study. To address this, the study identified the nature and determinants of bank supervisory decision in Nigeria, and evaluated the current early warning system (EWS) and its alternative candidate for managing distress in Nigeria.

This study found that the existing institutional and legal infrastructure for bank supervision in Nigeria is one of the best in Sub-Saharan Africa. The political authorities, however, appear rather slow in implementing the recommendations of the supervisory and regulatory authorities as regards the resolution of bank distress. The incentive structure at different levels of the system can induce a dampening effect on the operations of the supervisory and regulatory system, including the recommendations of the regulatory agencies, if it is not compatible. It recommended an in-depth and rigorous study of the incentive structure of the system with a view to designing a competitive structure that will facilitate effective supervision. It also suggested that supervisory and regulatory authorities use those significant determinants of distress identified by the study in targeting banks for closer monitoring and supervision.

1. Introduction

Financial liberalization in Nigeria brought in its wake a dramatic increase in the number and variety of financial institutions operating in the country. Commercial banks increased from 29 in 1986 when financial sector reforms began, by over 124% to 65 in 1992. The growth in the number of merchant banks was even more spectacular: it increased by 350% from 12 in 1986 to 54 in 1992. New deposit-taking financial institutions also came on stream as a result of financial sector reforms. Among banks, these included community banks, the People's Bank and mortgage banks, officially called primary mortgage institutions (PMIs). Among non-bank financial institutions (NBFIs) are finance houses or companies, unit trusts, and discount houses (Soyibo, 1996a). The establishment of the Nigeria Deposit Insurance Corporation (NDIC) in 1988 also came with financial sector reforms. NDIC is charged with the responsibility of insuring bank deposits, ensuring safe and sound banking practices through effective supervision, and assisting the Central Bank of Nigeria (CBN) to formulate banking policies with a view to ensuring the safety of the financial system (NDIC, 1995). In August 1987, the CBN for the first time ceased to prescribe interest rates for deposits and loans. Simultaneously, entry of new banks and NBFIs was liberalized. The use of the policy of directed credit was relaxed substantially (Soyibo, 1996a). Financial sector reforms were expected to ensure that interest rates were positive in real terms and to encourage savings, thereby ensuring that investment funds would be readily available to the real sector for borrowing from the banks. Besides this, the reforms were expected to lead to financial deepening and widening and as a result bring about competition in the financial sector. Customers of banks and NBFIs, alike, would then have a variety of different institutions and products to choose from.

The problem

Unfortunately, the initial optimism expressed about financial sector reforms has not been met (Soyibo, 1996a, 1996b). Although the reform programme led to increase in the number and variety of financial institutions and improvement in some macroeconomic aggregates like the real interest rate and measures of financial deepening (e.g., M2/GDP), there have been some disappointing performances. There has, for example, been no improvement in the maturity structure of the deposits of either commercial or merchant banks, which have always had a preponderance of short-term deposits. Yet, the demand for investment funds, which is usually long-term in nature, did

not diminish, leading to an asset–liability maturity mismatch. Besides, the rural areas continued to be underserved while there has been no improvement in the access of small- and medium-scale enterprises and the poor to credit. Consequently, these disadvantaged groups continue to seek refuge in the informal financial sector whose activities grew after the reforms (Soyibo, 1996a).

One worrisome aspect of the result of liberalization of the financial sector in Nigeria is the extent of distress in the sector. There are reports that 60 out of the total of 115 surviving banks in Nigeria are distressed, representing 52.2% of all banks (NDIC, 1995). A very high proportion of both community banks and finance houses are also reportedly distressed. Thus, for example, because of the adverse selection and incentive problems¹ that finance houses ran into for using non-price competition strategies to attract customers away from banks, a high rate of non-performing loans ensued, resulting in a high rate of default and insolvency in many of them in 1993 (Soyibo, 1996b).

The literature is replete accounts of the serious impacts of these crises on the economy, particularly as they affect the real sector. To avoid this, the supervisory agencies have attempted to monitor these banks to forestal the increasing wave of banking crises in the country, through both off-site and on-site examinations. In spite of these, the distress syndrome remains inadequately detected and controlled. The need for a better understanding of the nature and determinants of the supervisory and regulatory agencies' decisions in the early identification of non-healthy from healthy banks, therefore, becomes quite important. This is the focus of this study.

Objectives of the study

The study attempted to characterize the nature and determinants of bank distress in Nigeria, as well as the approaches adopted by the supervisory agencies to ensure that banks operate safe and sound practices. In doing this, it combined a non-normative (positive) model of supervisory action with a normative study of the CAMEL² model that examiners use.

Specifically, the objectives of this study are to:

- Characterize the nature and extent of bank distress.
- Identify and evaluate determinants of bank distress.
- Describe and evaluate the early warning system (EWS) being used by the regulatory authorities in Nigeria to predict bank distress.
- Suggest and evaluate alternative approaches for assessing the health status of banks.
- Proffer policy recommendations for improving the efficacy of bank supervision in Nigeria.

The literature review and the analytical framework adopted in the study are discussed in the next section. Section 3 describes the extent of bank regulation and supervision in Nigeria, while an analysis of the characteristics of bank distress in Nigeria is presented in Section 4. Determinants of bank condition are discussed in Section 5. We construct and evaluate alternative EWS models in Section 6, evaluate the effectiveness of bank supervision in Section 7 and draw conclusions in Section 8.

2. Literature review and analytical framework

As the supplier of credit, which promotes economic growth, the banking system remains an important sector of the modern economy. Governments the world over therefore supervise and regulate banks more than any other sector of the economy. In fact, Bench (1993) asserted that healthy (bank) supervision leads to healthy industry. A well supervised banking system not only helps prevent bank failures, it also contains built-in mechanisms for identifying faltering banking institutions and predicting failures. We review the literature discussing these issues in the discussions below.

Bank regulation and supervision

In this section, we borrow heavily from Sheng (1990). The primary objectives of bank supervision are to promote and develop a sound and wide range of financial services to meet the needs of the economy; ensure that the banks are efficient, secure and responsive to consumer needs and complaints; ensure compliance with laws and regulations conducive to fostering high standards of banking and professional conduct; and ensure that the behaviour of the banking system complies with monetary policy and credit allocation policies—bearing in mind that prudential regulations sometimes conflict with monetary policy/credit allocation objectives.

Giddy (1984) and Sheng (1990) provided four major reasons why banks should be regulated. The first reason relates to monetary policy—the ability of banks to create money. Second, as channels of credit or investment, banks are involved in credit allocation. Third, banks are regulated to ensure competition and innovation by preventing the formation of cartels. Fourth, for prudential regulation reasons and to mitigate the problem of asymmetric information, banks need to be regulated because they are depositories of private savings, are operators of payments mechanisms and are vulnerable to collapse.

If banks are not regulated and supervised for monetary policy purposes, their power to create money, if unchecked, might result in excessive monetary creation and hence inflation. Central banks often manipulate money supply through market operations via commercial banks and their supervisory power over the banks in order to reinforce the efficacy of monetary policy. Similarly, the need for regulation and supervision of banks for prudential reasons arises to ensure that public confidence in the banking system is maintained, particularly in relation to total convertibility of deposits without capital loss and the certainty that receipts and payments will be made for and on behalf of customers with no loss and at low cost.

Regulation in banking can be classified into two types: preventive regulation and protective regulation. In the preventive category are such measures taken by the authorities to restrict entry into banking business by licensing; the restriction of the types of business in which banks can engage; capital adequacy requirements; control of liquidity and statutory reserves; limits to which banks can lend or invest; and finally bank examination. Protective regulation in banking includes such measures as deposit insurance schemes and central bank assumption of control of banks. These measures also help to minimize ex ante loss of control of banking operations and maximize ex post damage mitigation.

There are four basic approaches to bank supervision. The first, information disclosure, involves two components: disclosure to the public through regular audited financial statements or announcements of operating results, and detailed disclosure to bank supervisors in which public disclosure may not be appropriate because of client secrecy.

The second approach is self-regulation using internal audit and controls, external auditors, and board audit committees. Sheng (1990) stresses that self-regulation appears to work well in matured, advanced financial markets where strong market discipline is imposed by the market leaders, built up through long traditions of integrity and professionalism. It fails during times of great change, either when the market leaders themselves are weak or when new competition and innovation change the rules of the game. At the point that market discipline breaks down, "rogue banks" with weak, incompetent or aggressive and/or fraudulent management can play havoc with markets, and self-regulation becomes paralysed through indecision and self-interest considerations. The example of failed new-generation banks in Nigeria is a case in point.

The third approach is through government bank examination. Typically, the scope of bank examinations is the on-site verification of a bank's financial condition, to ensure that the reporting of the bank's performance to the Central Bank is accurate, and that it is operating in a sound manner in compliance with the existing laws and regulations. When a bank's examination reveals deficiencies, remedial steps can be taken depending on the seriousness of the deficiencies. At its most extreme, this would involve assumption of control of the bank by the supervisory authorities to prevent further deterioration of financial condition and to protect depositors.

Finally, deposit guarantee schemes comprise a basic approach towards bank supervision. The problem of moral hazard is enhanced with the existence of deposit insurance schemes, however. Bank management can take higher risks with bank assets. Therefore, supervisory authorities usually have to step up monitoring systems and increase preventive measures of all sorts against abuses in the system.

The process of bank supervision takes two forms: regulatory or off-site monitoring and on-site inspection or bank examination. Bank regulation usually deals with the formulation and implementation of specific rules and regulations for the conduct of banking business, including the monitoring of compliance with such rules. Bank examination, on the other hand, ensures compliance with the rules and regulations and assesses the soundness of individual institutions. Sometimes the functions of bank regulation and examination are centred in one department, while in some central banks, such as Bank Negara Malaysia, they are separated into different departments as a matter of policy.

The bank regulation process can be divided into two phases: pre-operation and post-operation. In the first phase, which involves satisfying licensing requirements, the major aspects are: satisfying minimum capital requirements; ensuring that board and management are made up of "fit and proper persons" (i.e., no bankrupts or persons with criminal records are allowed to own or run banks); and prescribing ownership limits, e.g., individual ownership can be restricted to not more than 5% of paid-up capital. The post-operation regulation process involves monitoring and control over the activities of the bank according to laid-down rules and regulations.

These aspects of the process include information disclosure; restriction of business activities (which involves the types of business a bank must engage in and restriction on investments that can lead to connected lending, among others); and controls over changes in operations (some regulatory and supervisory agencies require notification of changes in control, ownership or management of banks). Post-operation regulations also prescribe risk control limits like credit risks, foreign exchange risks and interest rate/maturity risks, and stipulate liquidity and capital adequacy requirements. In addition, they aim to ensure information pooling and coordination, apply moral suasion and preventive measures, and facilitate policy and legal development.

In general, the bank examination process involves frequent on-site examination of bank operations to ascertain that the bank is operating in a sound manner, to determine the accuracy of financial reports to the regulator and the public, and to ascertain compliance with the law and regulations. Bank examinations are usually conducted on a surprise basis (without prior notice) and at random, on either selected branches or aspects of the operations of the bank. The examination could either be routine inspection or special in-depth investigation to uncover fraud or risk exposure.

Most bank examination activities involve the following:

- Determining financial position of the bank and quality of operations.
- Assessing management quality.
- Ascertaining compliance with laws and regulations.
- Testing accuracy of books, accounts and records.
- Verifying asset quality.
- Assessing bank solvency.

Other areas of bank examination include detection of the existence of fraud, either perpetuated by bank management or shareholders or depositors, and of illegal activities such as the laundering of illegal funds.

Causes of bank failure

CBN/NDIC (1995) asserted that the issue of causes of bank distress in any economy is basically empirical. The diversity of the experiences in bank distress in the regulatory and supervisory frameworks of different macroeconomic conditions, along with the available human and information capital of the financial system, makes it difficult to generalize across countries.

However, the literature lists a number of potential causes of distress in banks. Among these are poor management, inadequate capital base, fraud, and insider abuse by management and board members. Others are poor asset and liability management, macroeconomic instability, political instability/interference, inadequate legal frameworks and structures, and poor regulation and supervision. Competition, overly aggressive pursuit of growth, and excessive risk-taking can also contribute to bank distress (CBN/NDIC, 1995; Comptroller of the Currency, 1988; Short et al., 1985; Peterson and Scott, 1985).

Poor management is perhaps the greatest cause of bank failure. The Comptroller of the Currency (1988) ascribed over 90% of bank failures since deregulation in the United States to poor management and other internal problems. Managerial decisions to accept risk also play an important role in the determination of bank failures. Regulators can therefore be effective in averting failure by identifying banks following risky management strategies or where there is potential for fraud, early enough to prevent irreversible problems.

Banks with adequate capital tend to withstand problems of distress better than those with insufficient capital. However, capital adequacy cannot be viewed solely as a problem of managerial choice. Regulatory agencies normally specify acceptable levels of capital ratios for banks and often apply pressure to individual banks that maintain inadequate ratios to increase capitalization (Short et al., 1985). Adequate supervision and monitoring are therefore important for early detection of banks' lack of adequate capital.

The general economic environment can affect banks adversely. As borrowers from banks, corporations in the real sector may not be able to meet their obligations when due. This can lead to mounting non-performing assets in banks, which can erode banks' capital base, making them vulnerable to failure.

In effect, bank soundness is determined by bank-specific factors and macroeconomic conditions. In addition, when externalities or contagion effects exist in the system, then aggregate banking sector variables play a role in determining bank soundness (Gonzalez-Hermosillo et al., 1996). In particular, the contagion effects can work through information asymmetries affecting depositors' behaviour or through banks' "herding behaviour" in risk-taking.

Predicting bank failure

First, we shall discuss a few conceptual issues. A problem bank is one that is most likely to present substantial financial risk to the deposit insurance agency. Thus it is a bank that in the eyes of the bank regulatory agencies has violated a law or regulation or engaged in an "unsafe and unsound" banking practice to such an extent that the present or future solvency of the bank is in question (Sinkey, 1975a/b).

Two major problems can confront a bank, as any other profit-oriented organization. These are the problems of illiquidity and insolvency. A bank is said to be illiquid when it can no longer meet its liabilities as they mature for payments. On the other hand, a bank is said to be insolvent when the value of its realizable assets is less than the total value of its liabilities (Jimoh, 1993).

We note that an illiquid bank is not necessarily insolvent, while an insolvent bank may not be illiquid. Although insolvency should be taken more seriously than illiquidity, illiquidity can lead to insolvency particularly when it persists for a long time. In such a situation, the affected organization will be forced to sell its assets at fire-point prices and this can lead to insolvency when such sales are large enough.

Prediction of bank failure is usually based on the development of early warning systems (EWSs), which have the primary objective of minimizing the misclassification of problem banks as non-problem banks (type I error). To obtain classification information early, it is desirable to accept a higher type II error (classifying non-problem banks as problem banks) to gain a lower type I error. Additionally, the type II misclassification error would only place healthy banks higher in the examination queue of regulators than normal. Of course, this type of misclassification is not costless. However, as long as only a few non-problem banks are scheduled early for examination, the cost would be small compared with the benefits derived from early knowledge and early classification of potential problem banks (Pettway and Sinkey, 1980).

Nyong (1994) identified four potential advantages of using EWS models. First, an EWS model can assist regulators and supervisory authorities in the achievement of their mandate of timely identification of problem banks so that making appropriate interventions might result in fewer bank failures, fewer losses to depositors and fewer disruptions to the payment mechanism. Second, use of EWS models can lead to more efficient allocation of resources of regulatory and supervisory agencies among problem and non-problem banks. Third, such models provide a more objective approach to classifying banks into problem/non-problem categories than most ad hoc or heuristic methods. Finally, an EWS model provides a basis for critical self-assessment by banks so that they can take remedial action in good time to arrest any ensuing problem.

EWS models used for predicting bank failures grew out of attempts in the literature to use accounting data to predict corporate failures (e.g., Altman, 1968). In general, there are two approaches to using accounting data to predict corporate/bank failures: the traditional approach involving univariate financial ratio analysis and the more recent use of multiple ratio analysis such as multiple discriminant analysis, logit regression analysis, cluster analysis or the data envelopment analysis (Altman, 1968; Korobow and Stuhr, 1975; Sinkey, 1975a/b; Meyer and Piffer, 1970; Pantalone and Platt, 1987; Short et al., 1985; Peterson and Scott, 1985; Jimoh, 1993; Nyong, 1994; Sobodu and Akiode, 1994).

In general, in univariate financial ratio analysis for the prediction of corporate/bank failures, ratios measuring profitability, liquidity and solvency prevailed as the most significant indicators, although the order of importance usually was not clear (Altman, 1968). However, traditional univariate analysis is susceptible to faulty interpretation and is potentially confusing. Thus, for example, a bank with poor profitability and/or solvency record may be regarded as potentially bankrupt; but because of its above-average liquidity, the situation may not be regarded as serious.

A multivariate technique, like the multiple discriminant analysis (MDA), logit or probit analysis, for example, has the advantage of considering the entire profile of characteristics common to the relevant banks as well as interaction effects. A univariate study, on the other hand, can only consider the measurements used one at a time.

In practice, a sample of distressed banks is compared with a paired or random sample of healthy banks. Data for several years before some critical event (e.g., failure) are gathered and cleaned. To implement the models as EWS, they are applied to the population of banks to identify three institutions with characteristics similar to the failed or problem bank group.

Apart from using accounting data, EWS models use market data. Pettway and Sinkey (1980) pioneered model development in this area. The methodology used for the market model was developed by Sharpe (1963) and refined by Sharpe (1964) and Litner (1968), as well as others, to estimate parameters based on market returns of selected banks adjudged to have nominal potential for bankruptcy. The approach is useful for studying banks that are quoted on the stock exchange. Given that only a negligible proportion of banks are quoted in Nigeria, it is not suitable for the Nigerian situation.

EWS models based on accounting data do two main jobs. First, they identify the significant determinants of bank distress or bank failure. These are factors that regulatory authorities and management can focus on, in order to determine the health status of banks. Second, they can be used to classify banks into various categories, such as vulnerable/resistant, problem/healthy or failed/non-failed (Pentalone and Platt 1987; Short et al., 1985; Korobow and Stuhr, 1975; Peterson and Scott, 1985). An efficient EWS model should provide sufficient lead time so that a bank will have an opportunity to correct its problems. Conversely, a model that gives rather late indication of the poor health status of banks when they can no longer be redeemed is adjudged inefficient and useless.

The variables often used in EWS models include earnings/profitability variables (e.g., net income to total assets or net income to equity capital); operational efficiency variables (e.g., interest expense to total liabilities; interest on deposits to net income, compensation to total expense, operating expense to total income); leverage variables (e.g., equity capital to total assets, long-term debt to equity capital); risk/diversification variables (e.g., total loans to total assets, commercial and industrial loans/total loans, agricultural loans/total loans); tax burden ratios (e.g., income taxes to net income); deposit composition ratios like demand deposits to total deposits; and time and savings deposits to total deposits (Pentalone and Platt, 1987; Sinkey, 1975a). While these financial distress indicators have been very useful to bank examiners in their on-site and off-site functions, the emerging trend in the literature is to evolve some qualitative approaches for determining unbooked loan losses. Anecdotal evidence suggests that the capitalized value of "uncollectable interest" represents an unbooked cumulative loss that deserves to be charged against a bank's reported net worth to determine the genuine level of economic solvency. This approach, which tries to model a bank's supervisory decisions as a function of the bank's changing capitalization and riskiness, is yet to be fully developed in the literature.

In general bank-specific factors indicative of management problems such fraud and embezzlement, undue risk-taking, overly aggressive pursuit of growth, especially by newly established banks, sustained low performance of banks, and prevailing economic conditions significantly affect bank distress and bank failure (Comptroller of the Currency, 1988; Short et al., 1985).

Some EWS models, apart from identifying problem banks, can also determine the timing of failure. The two methodologies often used for this purpose are the Cox proportional hazard model and logit analysis (Gonzalez-Hermosillo et al., 1996; Cole and Gunther, 1995; Lane et al., 1986). The principal advantage of the Cox model is that it models the expected time to failure. MDA techniques and their variants (logit or probit), in the strict sense, tend to omit this. In addition, the parametric nature of these procedures requires certain assumptions that are often difficult to meet in most applications (Lane et al., 1986). In spite of this limitation, the logit approach is the most commonly used method of estimating EWS models and is adopted in this study.

The Analytical Framework

For this study, we examine the extent of bank supervision and regulation in Nigeria by analysing the degree of pre-operational and post-operational supervision and regulation activities of both the CBN and NDIC. How have these activities conformed with the standards established in the literature, for example? Have the rules and regulations left loopholes that have been exploited by the operators of the financial system to the disadvantage of the system?

In addition, we examine the extent to which the determinants of bank conditions in Nigeria conform with those established in the literature by using descriptive analysis and logit modelling techniques. We expect from the literature that bank health can be affected by ownership, size, age, type of bank and stock exchange quotation. A priori, we expect government-owned banks, small-sized banks, new-generation banks and banks not quoted on the stock exchange to be more prone to distress. While merchant banks can be prone to distress because of less diversified clientele and portfolio, commercial banks can also be prone to distress because of their vast branch network, which can also result in higher rates of non-performing loans that tend to eat deep into their capital.

Following the literature, we also postulate that the probability of failure of banks is a function of a number of factors, including earnings/profitability, operational efficiency, capital adequacy, risk/diversification and deposit composition, among others.

We also constructed EWS models using sub-samples of our data set. The effectiveness of these models are evaluated using the proportion of their types I and II errors. The current EWS in use is similarly evaluated. Additionally, based on our critique of the present EWS, we construct another CAMEL-based EWS and evaluated its predictive power.

The data

Data for this exercise were collected in two stages from the returns of banks to the NDIC. The first stage involved a stratified random sample of 72 commercial and merchant banks. Stratification was by asset size, while maintaining a balance between banks classified as distressed and healthy by the CBN/NDIC. Out of this, consistent data

were obtained for 64. The second stage involved coverage of the population of all 115 surviving banks. Out of these, consistent data were obtained for 94 and these were used for the study.

Definition of bank failure, in recent studies, is given in broad terms. Thus, Cole et al. (1995) define "failure" to include not only those cases where institutions are declared equity insolvent but also those for which regulators mandate prompt corrective action. Gonzalez-Hermisillo et al. (1996) define bank failure as equivalent to bank intervention in relation to banks receiving financial assistance other than short-term liquidity support.

In Nigeria, only five banks have been allowed to go under, in spite of the pervasive distress in the banking system. Some highly distressed banks have been placed under holding actions by the monetary authorities, however. Holding action banks (HABs) cannot advertise for deposits nor can they grant loans and advances, among other punitive actions. These banks were virtually not open for service. For our purpose, HABs or *failing* banks are taken as proxies for failed banks in the study.

Descriptive characteristics

We characterize HABs or failing banks by ownership, size, age, type of bank and stock exchange quotation. A descriptive analysis of the significant difference between some important financial ratios of HABs and non-HABs was done. This helped to identify variables that were used in constructing EWS models. Among the financial ratios used were net income to total assets, net income to equity, interest expense to total liabilities, interest income to total expense, equity to total assets, total loans to total assets, and loan composition ratios.

Logit modelling

We constructed models of determinants of bank distress and evaluated them as candidates for building EWS models, which provide the basis for bank supervision.³ A logit model of the following form was used in all cases:

$$L_i = \alpha + e_i \quad (1)$$

where

$$L_i = \begin{cases} 1 & \text{if bank } i \text{ is an HAB or a failing bank} \\ 0 & \text{if bank } i \text{ is a non-HAB} \end{cases}$$

α is a constant and β is a vector of parameters to be estimated, X is a vector of bank-specific attributes or measures and exogenous market and regulatory factors, while e_i is an error term.

X consists of such ratios and attributes relating to profitability, management efficiency, leverage, risk/diversification, economic condition, ownership, type of bank, age of bank and stock exchange quotation.

The expectation is that probability of bank distress or failure is inversely related to profitability. Thus, the higher the profitability, the lower the chance of failure. We measured profitability using two ratios: net income to total assets, and net income to equity capital. Operational efficiency, proxied by interest expense to liabilities, compensation to total expense, or interest on deposit to net income, is directly related to bank distress.

The higher the ratio of equity capital to total assets (proxy for leverage or capital adequacy), all things being equal, the lower the chance of distress. Thus capital adequacy is expected to be inversely related to distress. Banks with high ratios of loans to total assets tend to stand high risk of distress and failure. Notwithstanding, some banks with such high ratios may have good experience of credit management policies and non-performing assets and hence have less likelihood of failure. Thus, the relationship can be positive or negative.

Real estate loans are long term in nature and risky. Hence a bank having a high ratio of such loans to total loans stands the risk of distress. Similarly, a high ratio of agricultural loans to total loans, because of their risky nature, tends to encourage bank distress. However, given complementary policy like the agricultural credit guarantee scheme and agricultural insurance, the risk can be attenuated.

Banks generally thrive under conditions of economic boom. Thus economic boom is negatively related to distress or failure. For this study, the state of the economy was proxied by absolute or percentage change in manufacturing capacity utilization and the real growth rate of GDP. Government-owned banks tend to have a higher ratio of non-performing assets and hence a higher probability of distress. Ownership, a binary variable, takes a value of 1 if government owned and 0 if private. Commercial banks tend to have more branches and more assets and to be more diversified. Accordingly, they should be less prone to distress and failure. The bank type variable takes a value of 1 if the bank is commercial and 0 if it is merchant. Older banks tend to be more stabilized and to have more experienced staff, as well as adequate capital and assets to withstand the vicissitudes of aggressive banking. Besides, Comptroller of the Currency (1988) found that newly established banks tend to engage in overly aggressive growth strategies, making them highly vulnerably to distress and possibly failure. For this study, therefore, the age variable is binary, taking the value of 1 if the bank is new generation and 0 if it is old generation. This variable should have a positive relationship with distress. New generation banks are defined as those established in 1987 and after.

Banks quoted on the stock exchange are subject to great regulatory and supervisory rules and regulations that tend to moderate the behaviour of management and may limit excessive risk-taking by bank management and board. Accordingly, it is expected that banks quoted on the stock exchange have a lower probability of distress or failure than unquoted banks. The stock exchange variable takes the value 1 if the bank is unquoted and 0 if it is quoted. Thus, there should be a positive relationship between this variable

and bank distress.

The L_i of Equation 1 is given by Gujarati (1995) as:

$$L_i = \text{Log}\left(\frac{P_i}{1-P_i}\right) \quad (2)$$

where

P_i = Probability of distress or failure of bank i .

$\text{Log}\left(\frac{P_i}{1-P_i}\right)$ is called the *odds ratio* in favour of bank failure or distress.

$$\frac{P_i}{1-P_i} = \exp(\alpha + \beta X + e_i) \quad (3)$$

Combining equations 1 and 2, if we set

$$\exp(\alpha + \beta X + e_i) = K \quad (4)$$

$$P_i = \frac{K}{1+K} \quad (5)$$

We can solve for P_i in (3) for each bank.

Equation 5 can be used to determine the probability of a bank being an HAB after Equation 1 has been estimated.¹ This can then be used to assess the effectiveness of (1) as an EWS.

3. The extent of bank regulation and supervision in Nigeria

The phases of bank regulation and supervision in Nigeria can be classified into three:

- The post Nigerian Banking Ordinance period (1952–1958)
- The post-CBN establishment period (1959–1986)
- The era of financial reforms (1987 to date)

The bank failures that came with the period of free banking—largely the failure of indigenous banks—brought serious hardships to many depositors, leading to the enactment of the Banking Ordinance of 1952. This brought some sanity into the banking scene. The ordinance was amended in 1958 and 1962 and finally repealed in 1969 with the enactment of the Banking Decree. The 1952 ordinance was principally to regulate banking operations and practice.

The establishment of the CBN in 1959 as the apex regulatory agency for licensed banks ushered in another phase of bank regulation and supervision in Nigeria. The act establishing the CBN as well as the 1969 Banking Decree were repealed with the promulgation of the CBN Decree 24 of 1991 and the Banking and Other Financial Institutions Decree (BOFID) 25 of 1991. These decrees, respectively, specify the regulatory and supervisory powers of the CBN over banks and other financial institutions, as well as the rules governing the establishment, administration and duties of licensed banks and other financial institutions operating in Nigeria (NDIC, 1991b).

With financial liberalization a number of steps were taken to ensure that banks are supplied with quality staff and that the operations of banks are streamlined. These steps culminated in the promulgation of the Chartered Institute of Bankers (CIBN) Decree 12 of 1990, the promulgation of the NDIC Decree 22 of 1988, the CBN Decree of 1991 and the BOFID, both mentioned earlier, as well as the introduction of the Prudential Guidelines in November 1990 (Soyibo, 1991). The NDIC was empowered to insure the deposits of licensed banks to protect, in particular, small savers. The Corporation is expected to complement the efforts of the CBN in bank supervision so as to ensure a safe and sound banking system. The BOFID enhanced the powers of the CBN, giving the CBN overall responsibility for the control of the banking system. Prior to the promulgation of BOFID, the Minister of Finance was responsible for granting and withdrawing banking licences and it was to the Minister that all matters pertaining to problem and/or failing banks were referred for resolution.

It is instructive to note that both the CBN and NDIC decrees were amended early in 1997. The CBN was again placed under the Ministry of Finance and the NDIC was

granted operational autonomy to handle resolution of distress in banks.

The Process of bank supervision

This section borrows heavily from NDIC (1991b). As in most systems, bank examination in Nigeria is categorized into two: off-site supervision and on-site (field) examination. We discuss each of these components in turn.

Off-site supervision

The BOFID stipulates that certain statutory returns be provided to the CBN. These include monthly statements of assets and liabilities, reports on loans and advances, annual profit and loss statements and balance sheets, and auditors' reports and analyses of bad and doubtful loans, among others. Copies of these returns are also submitted to the NDIC. In addition, the NDIC requires the external auditors of banks to furnish it (on an annual basis) with a report of the operations of all licensed banks they audit. This report complements the returns submitted directly to the Corporation by the individual banks.

Although the sources of data are mainly the same, the CBN and NDIC carry out independent off-site supervision of licensed banks. The CBN's off-site examination focuses mainly on compliance with statutory requirements such as the liquidity ratio, cash reserves and others prescribed in the relevant monetary policy circular.

The NDIC's off-site examination, on the other hand, covers a review of the CAMEL. The objective is to use off-site examination as an early warning system for identifying potential distress in licensed banks.

On-site (field) examination

Field or on-site examinations are classified into three: maiden, routine or special. Maiden examinations are carried out six months after a bank commences operations. The objective is to ascertain whether or not the bank complies with the conditions under which it was granted licence. It also ensures that new banks are guided on the right path from their commencement of operation, as well as to ascertain the safety and soundness of their start-up policies.

Routine examinations are carried out to establish the soundness or otherwise of the financial condition of individual banks, their ability to meet the demands of depositors and creditors, the competence of their management and observance of regulations, and their solvency and viability as going concerns. Currently, the frequency of on-site examinations is, on average, once a year. Examination coverage generally involves visiting a bank's head office and major branches. As a minimum, the head office and the branches visited should account for at least 70% of the total risk assets of the bank. After every routine examination, there is a follow-up action to monitor compliance with the recommendations contained in the report.

Special examinations are conducted when the CBN/NDIC have reason to believe that a bank is carrying on its business in a manner detrimental to the interests of its depositors and other creditors, has insufficient assets to cover its liabilities, or is contravening the provisions of the Banking and NDIC decrees.

Current EWS for identifying distress

The EWS in use by the CBN/NDIC is based on the CAMEL parameters. For this purpose, thresholds, based on either international standards or local conditions are used to assess a bank's financial condition. A composite measure that is a weighted average of the scores on the various components of the CAMEL parameters is assigned to each bank. These weights are not scientifically determined, however, but based on subjective judgment. The different factors and scoring weights attached to them are shown in Table 1.

Table 1: Weights of CAMEL factors in use in Nigeria

Factor	Component	Component weight (%)	Factor weight (%)
1. Capital	a. Capital to risk assets ratio	15	25
	b. Adjusted capital ratio	5	
	c. Capital growth rate	5	
2. Asset quality	a. Non-performing risk assets to total risk assets	15	25
	b. Reserve for losses to non-performing risk assets	5	
	c. Non-performing risk assets to capital and reserves	5	
3. Management	a. CAEL/85*	5	15
	b. Compliance with laws/regulations	10	
4. Earnings	a. Profit sector tax to total assets	5	20
	b. Total expenses to total income**	5	
	c. Net interest income to total earning assets	5	
	d. Interest expenses to total earning assets	5	
5. Liquidity	a. Liquidity ratio	5	15
	b. Net loans and advances to total deposits	5	
	c. Volatile dependence ratio	5	
TOTAL		100	

Notes:

* CAEL/85 is composite scores for Capital, Assets, Earnings and Liquidity divided by 85.

** Net of interest in suspense.

For the composite CAMEL rating used, the final score by each bank i , in Nigeria is computed as follows:

Let w_{pc} = maximum weight allotted to component c , of CAMEL parameter P , where
 p = 1,2,3,4,5 (with $p = 1$ is capital, $p = 2$ is asset quality etc).
 S_{ci} = credit score for component c of bank i .
 C_i = composite score for bank i .

Then,

$$C_i = \sum_p \sum_c w_{pc} S_{ci}, \text{ for each } i \quad (6)$$

Thus, C_i is such that $0 \leq C_i \leq 100$, for each i .

This method relies on giving scores or credit points depending on performance in relation to specified threshold values. In this connection, there are three types of such threshold values. These are based on prescription of:

- Maximum threshold values
- Minimum threshold values
- Miscellaneously specified threshold values

The first class of rating schemes usually specifies two scoring steps for the relevant component of the corresponding CAMEL parameters. The general rule (where $r\%$ is the specified maximum threshold value) can be given as follows. If the ratio is:

- $> r\%$, then the credit point is zero
- $\# r\%$, then the credit point is prorated uniformly from zero to 100

Examples of components belonging to this class of rating schemes are:

- All the components of asset quality
- Ratio of interest expense to average interest-bearing liabilities (a component of earnings)
- Adjusted capital ratio (a component of capital)

The second class of rating schemes specifies three scoring steps for the relevant parameter component. In general, its scoring rule can be stated as follows. If the ratio is:

- $\# 0$, the credit point is zero
- $\exists r\%$, then credit point is 100
- > 0 but $< r\%$, credit point is prorated uniformly from zero to 100

Examples of components belonging to this class are:

- Capital to risk weighted assets ratio and capital growth ratio (components of capital)

- All component of earnings except ratio of interest-bearing liabilities
 - Minimum liquidity ratio (component of liquidity)
- Finally, the third category of rating schemes usually specifies more than three scoring steps. In this case, specification of threshold values depends on a lot of factors that can vary from situation to situation. Consequently, the scoring schemes cannot be generalized. Components scored using this scheme include:
- Net credit to total deposit liabilities and volatile liability dependence ratio (components of liquidity)
 - All of the components if the management parameter of CAMEL

The component rating approach using CAMEL parameters is based on a heuristic approach that has been seen to “work” and is not without shortcomings.

The component score and the rating system used by the supervisory and regulatory authorities in Nigeria are shown in Table 2. Banks rated “A” are regarded as very sound, while those rated “B” are called sound. In both cases, any adverse findings detected from time to time are expected to be insignificant and will be such that they can be handled in a routine manner. A bank with a rating “C” is one whose financial condition is fundamentally sound and stable and which should be able to withstand business fluctuations; its adverse findings are minor in nature, with supervisory concern limited to the extent that findings are corrected.

The next two classes of banks give regulators cause to worry. An institution rated “D” and classified as “marginal” is likely to have some serious financial weaknesses, with unsafe and unsound conditions existing but not being satisfactorily addressed. For such an institution, close supervision and definite plans for correcting deficiencies must be evolved to prevent further deterioration of a situation that is likely to impair further viability and lead to high risk of failure.

Table 2: Bank classification based on the composite rating scheme

Class	Composite score (%)	Rating
A	86–100	Very sound
B	71–85	Sound
C	56–70	Satisfactory
D	41–55	Marginal
E	0–40	Unsound

Finally, banks rated “E” and classified as “unsound” have immediate probability of failure. Weaknesses are severe and critical, requiring urgent assistance from owners or other financial sources.

A critique of the current EWS

Our review of some of the weaknesses of the current EWS in use in Nigeria begins with a discussion of the system's assumptions about the quality of bank returns, then moves on to a look at the availability of information, an assessment of performance thresholds and management criteria, and a comment on the static nature of the analysis.

Quality of bank returns

One of the most serious assumptions appears to be the notion that the information turned in by banks for assessing the health status is accurate and reliable. This is likely to be far from the truth, as many banks appear to keep multiple records thereby hiding their misdemeanors from the regulatory authorities. The reports of on-site examinations conducted by CBN and NDIC clearly indicate that banks have not been accurately reporting irregularities and losses. As a result, the distressed conditions of the banks are not known to supervisory authorities until it becomes too late for any remedial action to prevent failure to be contemplated and carried out. This probably is the main reason for a sudden adverse rating of a bank from "sound" to "unsound", jumping the "satisfactory" and "marginal" rating within a relatively short period.

Non availability of market-based information

The problem associated with the current method of relying solely on accounting-based information could be mitigated to some extent if it were complemented by market-based data. One of the main reasons for excluding market-based information is that very few banks (22 out of 115, or 19.1%) are quoted on the Nigerian Stock Exchange. It was argued that there would not be basis for comparison if market-based information were used, as it would not apply to most of the banks. Alternatively, the pseudo default rate—the difference between the average contract interest rate on various categories of a bank's loans and the fair market rate such loans deserve—can be used. This can be compared with the contract returns earned on loans at the upper quartile of profitable banks. With this, the unbooked cumulative loss that deserves being charged against a bank's reported net worth can be determined approximately. This will throw some light on the extent of economic insolvency of banks.

The thresholds

The justification for many of the benchmarks may not be as obvious as imagined, as many of the thresholds are selected more on a rule of thumb approach. Even for those that are based on international standards, the way and manner they are used in

apportioning credit points requires a second look. For example, a bank that meets the international standard of 8% risk-weighted assets ratio scores 50 out of maximum 100 points. In addition, a bank whose risk-weighted assets ratio is 2% scores 12.5 points, whereas in some countries such a bank would be earmarked for immediate closure. The 10% adjusted capital ratio is also difficult to justify, as the basis for arriving at the benchmark cannot be easily understood. It is mentioned that it is used to assess under-trading or over-trading, for which the loans to deposits ratio appears to be a superior benchmark. The leverage ratio of 5%, which is more common worldwide, may even be preferred to the adjusted capital ratio. Also, capital growth is at best complementary to the risk-weighted assets ratio, as a bank's capital is likely to grow with its volume of activities. The ratio therefore appears redundant. The capital growth rate is computed on a yearly basis, which is too long to serve as a parameter in an EWS and also compared with ratios that are based on monthly data.

The determination of the maximum of 20% non-performing risk assets to total risk assets does not seem to be based on any scientific consideration. The ratio of reserves for losses to non-performing risk assets also appears redundant and at best complementary as it will give the same ratio as non-performing assets to total assets in a situation where the classified other assets and off-balance sheet engagements are not significant. Yet, the two components have been given varied weights of 15 for non-performing risk assets to total risk assets and 5 for reserve for losses to non-performing risk assets. The ratio of non-performing risk assets to capital and reserves relates more to capital adequacy than to asset quality. It therefore appears superfluous.

Even though the minimum liquidity ratio stipulated by the CBN is 30%, a bank must have 60% or more to score 100 credit points. This would only encourage banks to maintain excessive liquidity instead of investing in high earning assets. The use of the loans to deposits ratio as a measure of distress has to be interpreted with caution. It is important to note that if the ratio is above 70% and the loans are performing, the situation is not worrisome. It is when the facilities become classified whether the ratio is 70%, below or above it that the financial condition of the bank is impaired. This statement is not clear. In any case, the asset quality measure appears to render this ratio unimportant.

The quality of management

There appears to be a universal consensus that the quality of management makes the difference between a sound and an unsound bank. It does not appear as if the current method used for assessing management has taken adequate care to recognize the magnitude of management problems, as some components (and perhaps the more important ones!) of management are excluded. Fraud in banks is a serious lapse of management that portrays the internal controls as defective and porous, and yet no measure is designed to capture this. Also, the exposure of a bank to its insiders is a management problem, going by the benefits of hindsight in Nigeria. Such facilities easily become sticky and doubtful of recovery.

The non-compliance of banks to monetary and credit policy guidelines should not

necessarily have adverse implications for their financial health. As a matter of fact, some of these banks attempt to circumvent the credit guidelines for a more robust financial condition. It is therefore inexplicable to put compliance with excess growth, small-scale credit allocation, sectoral credit allocation and legal lending limits as necessary for improving the health standing of a bank.

Static analysis

The method currently in use is static, as only “point-in-time” information is analysed. This precludes analysis of the operating performance of a bank, as what transpired prior to the analysis date is not adequately captured to influence the measure of health of the bank at that time. A situation where some banks do window-dressing of their accounts especially at the end of their financial year may obviate the happenings before then and therefore the assessment may be faulty.

4. Characteristics of bank distress in Nigeria

Banking sector deregulation appears to bring in its wake increasing distress in banks. In some countries government liberalized to provide last-chance insolvent banks the opportunity to grow out of their hidden insolvency at depositors or taxpayers' expense. By contrast, Nigeria's liberalization efforts were brought about by the need to move out of the deep-rooted financial repression in which the economy found itself. Admittedly, liberalization of interest rates in Nigeria was not properly sequenced. As such it triggered financial insolvency, thereby causing many banks to exhibit serious conditions of distress. Thus in 1990, the National Bank of Nigeria was placed under holding action. The number of cumulative HABs increased to 6 in 1991, 10 in 1992, 17 in 1993, 29 in 1994, 35 in 1995 and 40 in 1996 (Table 3).

Table 3 also shows the distribution of HABs by type of bank, ownership, whether quoted on the stock exchange or not, age, and size. It can be seen that more merchant than commercial banks were placed under holding action between 1992 and 1993. However, there is no significant difference between number of commercial and merchant banks placed under holding action between 1990 and 1996. Table 3 suggests that there is a big difference – 15 merchant and 25 commercial banks.

While only government-owned banks were placed under holding action between 1990 and 1992, more private banks have been placed under holding action since 1993. In fact, using Chi-square, ownership is a significant factor accounting for bank distress: $X^2_{(6)} = 20.2 > 12.6$. What are these X-box symbols supposed to be? On one printout they are $5s. = 20.2 > 12.6$. Similarly, a higher proportion of new generation banks tends to fail than old generation banks. Age was found to be a significant factor accounting for distress ($X^2_{(6)} = 19.5 > 12.6$). Unquoted banks, as expected, were more distressed than quoted banks. Quotation on the stock exchange was found to be a significant factor accounting for distress: $X^2_{(6)} = 13.0 > 12.6$. These identified significant factors—ownership, age and stock exchange quotation—have implications for the management of assets and liabilities in the banks. Thus, as expected, the analysis so far suggests that management has a lot to do with distress in the Nigerian banks. This is in agreement with the findings of Pentalone and Platt (1987), Comptroller of the Currency (1988), and Short et al. (1985) for banks in the United States.

Table 3: Some characteristics of holding action banks (HABs) 1990-1996

	1990	1991	1992	1993	1994	1995	1996	Total
1. Type								
• Commercial	1	5	1	2	8	4	4	25
• Merchant	0	0	3	5	4	2	1	15
• Total	1	5	4	7	12	6	5	40
2. Ownership								
• Private	0	0	0	6	9	5	4	24
• Government	1	5	4	1	3	1	1	16
• Total	1	5	4	7	12	6	5	40
3. Whether quoted								
• Quoted	0	3	0	0	1	1	0	5
• Not quoted	1	2	4	7	11	5	5	35
• Total	1	5	4	7	12	6	5	40
4. Age								
• Old generation	1	5	4	0	3	1	0	14
• New generation	0	0	0	7	9	5	5	26
• Total	1	5	4	7	12	6	5	40
5. Size (assets: billion)								
Commercial banks								
1. Below 1.0	0	0	0	2	6	2	1	11
2. 1.0-5.0	1	5	0	0	2	2	3	13
3. 5.0-20.0	0	0	1	0	0	0	0	1
4. Above 20.0	0	0	0	0	0	0	0	0
Total	1	5	1	2	8	4	4	25
Merchant banks								
1. Below 0.5	0	0	1	4	4	1	1	11
2. 0.5-1.0	0	0	0	0	0	1	0	1
3. 1.0-5.0	0	0	2	1	0	0	0	3
4. Above 5.0	0	0	0	0	0	0	0	0
Total	0	0	3	5	4	2	1	15
6. Cumulative HABs	1	6	10	17	29	35	40	N.A

Expectedly, earnings/profitability was found to distinguish distressed banks from healthy banks. Thus, the ratio of net income to total assets averaged -7.3% for HABs, and 7.0% for non-HABs. This difference is significant at the 5% level (see Table 4). However, the difference in the ratio of net income to equity, a measure of return on equity (ROE), between HABs and healthy banks was not found to be significant. In fact, both groups of banks, on average, recorded negative returns on equity, suggesting that over the study period, bank equity investors did not receive adequate returns on their investment.

Capital adequacy, measured by the ratio of equity to total assets, was found to be a highly statistically significant distinguishing characteristic of bank condition. On average, between 1992 and 1996, HABs recorded a value of -90.2% for this. Correspondingly, healthy banks in our sample recorded an average of 37.5%.

Non-distressed banks tend to have higher ratios of demand deposits to total deposits and of inter-bank deposits to total deposits. While the difference in the ratio of inter-bank deposits to total deposits is highly statistically significant, that of demand deposits to total deposits is not significant. The higher values of both ratios for healthy banks is a measure of public confidence in them. Perceived fragility of problem banks will cause the public and other banks to place fewer deposits in them.

It is interesting that between 1992 and 1996 the dividend declared by HABs, on average, was nearly 14 times the net income. This suggests that some HABs may have paid shareholders excessive returns over this period, in spite of negative returns on assets and equity for this group of banks. This tends to support the view in the literature of the presence of "rogue banks" with fraudulent management masquerading as aggressive players in the financial system to the point of breakdown in market discipline, making self-regulation by players difficult. The very high value of the standard deviation of this variable suggests that the practice is limited to a few of HABs, and not widespread.

HABs tend to be more involved in risky lending. Thus, on average over the period 1992-1996, the ratio of real estate loans to total loans for HABs was more than twice that for non-HABs (3.0% to 1.4%). The difference is significant at 1%.

Banks have often complained about the use of stabilization securities to mop up excess liquidity by the CBN. Our analysis suggests that both distressed and healthy banks are equally affected, as there is no significant difference in the ratios of stabilization securities to government securities for the two groups. However, the allegation of banks that the instrument causes illiquidity in the system appears not to be without foundation. This is because stabilization securities on average mopped up over three times more liquidity as government securities do for healthy banks and nearly twice as much for distressed banks. It is therefore important that government revisits the overall effectiveness of the instrument to the financial system beyond the narrow objective of controlling "excess" liquidity.

On average, distressed banks tend to make higher provisions for non-performing loans, suggesting that they have higher credit risk. However, there is no significant difference in the value of the ratios. As mentioned earlier, market risk, proxied by loan concentration, is also higher for distressed banks.

There are significant differences in bank performance for each of the years of the study period. Return on equity, for example, accounted for significant differences among HABs and non-HABs in 1993. While healthy banks recorded an average return of 57.3% on equity, distressed banks returned a mere 8.2% (Appendix Table A1). In contrast, both groups of banks recorded negative returns on equity in 1994 and 1995 (Appendix Tables A2 and A3).

Interest income has always been a major source of earnings for Nigerian banks. In 1993, however, when deposit rates went up to between 30 and over 40% and inter-bank rates were in excess of 100%, it was a significant determinant of bank condition. For

each of the years 1993 to 1995, non-HABs tended to pay more dividends than HABs, although the difference is not significant.

Table 4: Selected performance measures, 1992–1995 (percent)

	HABs			Non-HABs		
	Mean	Std. Dev.	N	Mean	Std. Dev.	N
Net income/Total assets**	-7.3	35.2	68	7.0	136.5	308
Net income/Equity	-51.2	220.5	84	-2.7	1,266.8	355
Interest expense/Total liabilities	28.3	108.4	72	11.7	27.9	312
Interest income/Net income**	1,092.9	7,289.6	69	1,420.1	8,165.1	320
Staff expense/Total expense	28.2	85.3	39	18.9	30.5	273
Equity/Total assets*	-90.2	251.9	68	37.5	321.2	305
Total loans/Total assets	110.4	118.6	68	521.8	5,643.9	307
Demand deposits/Total deposits	29.9	23.9	85	40.6	24.4	359
Inter-bank deposits/Total deposit*	11.6	33.6	85	20.6	46.6	359
Stabilization securities/ Govt. securities	170.3	524.3	36	350.6	994.1	317
Dividends/Net income	1,368.6	10,798.0	63	16.9	172.1	310
Loan provisions/Net income*	506.0	2240.3	62	321.2	2,362.1	309
Agric loans/Total loans	5.1	7.5	83	5.9	9.5	348
Manufacturing loans Total loans	14.0	20.5	83	14.7	23.2	348
Real estate loans/Total loans	3.0	4.9	83	1.4	3.7	348
General commerce loans/Total loans	6.8	10.7	83	5.6	10.0	348

Notes: * Significant at 1% level
 ** Significant at 5% level
 *** Significant at 10% level

It is difficult to make a general statement as to whether financial conditions affect the judgment of the CBN in using stabilization securities to mop up liquidity from banks. In 1993, for example, on average healthy banks were debited more than HABs. By contrast, in 1994, when the number of HABs increased by over 70% from 17 to 29, HABs were debited more, on average by 64.4% of stabilization securities as a ratio of government

Table 5: Selected performance measures, 1993 (percent)

	HABs			Non-HABs		
	Mean	Std. Dev.	N	Mean	Std. Dev.	N
Net income/Total assets**	-8.9	27.2	11	6.8	20.3	68
Net income/Equity*	8.2	29.4	13	57.3	119.7	80
Interest expense/Total liabilities	65.3	154.3	10	12.8	11.1	69
Interest income/Net income*	-529.5	2,477.3	10	2,073.7	10,197.8	73
Staff expense/Total expense	7.9	10.7	7	12.0	31.7	48
Equity/Total assets***	-8.2	33.9	11	13.1	46.0	68
Total loans/Total assets	86.6	42.7	11	198.3	629.3	68
Demand deposits/Total deposits	27.8	23.5	13	38.4	22.0	81
Inter-bank deposits/Total deposit*	6.7	13.8	13	7.9	36.6	81
Stabilization securities/ Govt. securities	312.0	764.2	6	458.9	1,612.0	69
Dividends/Net income	16.9	35.6	9	29.6	73.2	72
Loan provisions/Net income	500.3	1,502.4	9	363.4	1,646.4	72
Agric loans/Total loans	3.5	6.7	13	5.9	9.7	80
Manufacturing loans Total loans	11.0	21.4	13	14.5	23.3	80
Real estate loans/Total loans*	2.4	4.7	13	1.8	3.8	80
General commerce loans/Total loans***	2.7	5.1	13	6.3	12.5	80

Notes: * Significant at 1% level

** Significant at 5% level

*** Significant at 10% level

securities. In 1995, stabilization securities as a ratio of government securities was a significant determinant of distress. During this year, non-HABs were debited much more than HABs, suggesting that HABs had a lot of liquidity constraints. In particular, in 1995, when the problem of distress had become much more pronounced, our results indicate that capital adequacy was a significant determinant of bank condition, with HABs having negative capital adequacy ratios and healthy banks having positive ratios. On average, healthy banks had higher ratios of loans to total assets, indicating perhaps more capable ability in lending and credit administration.

Table 6: Selected performance measures, 1994 (percent)

	HABs			Non-HABs		
	Mean	Std. Dev.	N	Mean	Std. Dev.	N
Net income/Total assets	-7.3	15.2	15	27.9	204.6	63
Net income/Equity	-90.5	379.2	20	-144.6	1,545.4	73
Interest expense/Total liabilities	58.5	185.5	16	9.4	9.7	64
Interest income/Net income*	61.7	468.9	16	680.9	1,887.6	66
Staff expense/Total expense	12.5	16.1	11	20.3	21.4	43
Equity/Total assets***	-62.1	129.3	15	106.0	696.6	63
Total loans/Total assets*	96.0	28.7	15	1,709.0	12,376.2	63
Demand deposits/Total deposits*	25.7	17.0	20	45.0	24.8	73
Inter-bank deposits/Total deposit	9.4	17.7	20	17.3	36.6	73
Stabilization securities/ Govt. securities	218.5	471.9	9	155.1	2.1	64
Dividends/Net income	10.9	29.2	14	23.3	82.0	65
Loan provisions/Net income	356.7	865.6	13	136.2	489.8	64
Agric loans/Total loans	7.7	8.6	20	8.6	10.7	70
Manufacturing loans Total loans	18.1	20.4	20	20.5	25.4	70
Real estate loans/Total loans	5.6	6.4	20	2.0	5.5	70
General commerce loans/Total loans	8.8	10.5	20	7.3	9.5	70

Notes: * Significant at 1% level
 ** Significant at 5% level
 *** Significant at 10% level

Loan concentration ratios, as proxies for market risk, also differed significantly between HABs and non-HABs in 1995. HABs tended to have higher ratios in risky areas. For example, they have higher ratios of real estate loans to total loans. In contrast, healthy banks have higher ratios of agricultural loans to total loans and of general commerce loans to total loans. These two loan categories are less risky than real estate loans in that they have shorter maturities and, in the case of agriculture, are also protected through the agricultural credit guarantee scheme. Thus, it could be seen that HABs appear to be more involved in riskier lending than non-HABs.

Table 7: Selected performance measures, 1995 (percent)

	HABs			Non-HABs		
	Mean	Std. Dev.	N	Mean	Std. Dev.	N
Net income/Total assets	-10.1	44.1	19	-22.6	189.4	59
Net income/Equity	-62.5	177.7	24	-252.3	2,136.0	67
Interest expense/Total liabilities	6.1	13.6	20	7.6	11.1	59
Interest income/Net income*	150.2	1,418.6	20	591.8	1,554.0	60
Staff expense/Total expense	22.4	23.6	11	23.9	18.5	42
Equity/Total assets***	-79.7	168.2	19	19.0	65.6	59
Total loans/Total assets*	93.6	39.4	19	180.9	223.3	58
Demand deposits/Total deposits*	28.2	22.7	24	41.1	25.4	68
Inter-bank deposits/Total deposits	14.7	44.4	24	17.6	25.2	68
Stabilization securities/ Govt. securities	1.7	5.1	9	244.7	486.3	63
Dividends/Net income	5.3	22.9	19	25.4	137.4	58
Loan provisions/Net income	6.3	306.7	19	128.9	514.8	58
Agric loans/Total loans	5.8	8.0	24	9.6	10.5	67
Manufacturing loans/Total loans	15.5	20.8	24	23.5	25.4	67
Real estate loans/Total loans*	3.3	4.8	24	1.8	3.1	67
General commerce loans/Total loans	8.6	12.1	24	8.6	10.2	67

Notes: * Significant at 1% level
 ** Significant at 5% level
 *** Significant at 10% level

The ratios of demand deposits to total deposits and of inter-bank deposits to total deposits were higher in non-HABs in 1995. These ratios can indicate stronger confidence in these banks by the public and other financial institutions. They also suggest that non-HABs have greater access to cheaper sources of funds.

In summary, the foregoing descriptive analysis suggests that the significant determinants of bank failure in Nigeria include: ownership, type of bank, quotation on stock exchange, age, earnings/profitability, capital adequacy, operational efficiency, market risk and credit risk, among others. These are the variables that will be used in our model of determinants of bank failure undertaken in the next section.

5. Determinants of bank condition

Our model for identifying the determinants of bank condition uses logit analysis for both cross-sectional and panel data. It also takes into consideration the usual caveats for logit estimation under a panel data framework, e.g., fixed effects (Chamberlain, 1980). From the cross-sectional data, it will be seen that determinants of bank failure vary from year to year, indicating the effect of the bank's annual performance on its survival as an entity. This agrees with our findings in the descriptive data analysis discussed above.

The earnings/profitability ratio, proxied by ROE, is a negative determinant of bank failure at 10% (Table 5). Thus, the higher the bank profitability, the less likely it is to fail. This agrees with our expectation. The result clearly shows that interest expense is a good proxy for a bank's weakened financial condition; it is significant at 1% using 1993 and 1994 data. This conforms to credit rationing theory that suggests that increases in interest rates can be an important factor in precipitating financial crisis. As argued in the literature (e.g., Mishkin, 1997), if interest rates are very high there is a higher possibility that a lender will lend to bad credit risks because good credit risks are less likely to want to borrow at the higher rates while bad credit risks are still willing to borrow. With precipitating asymmetric information and the resulting adverse selection, the possibility of serious loan delinquencies becomes higher. Thus, banks that raise expensive deposits are more likely to fail. In fact, this is the only significant predictor of distress in 1994. In particular in 1993 and 1994, the 12-month deposit rates for commercial banks varied between 20 and 28% while for merchant banks they were between 30 and 40%. Maximum lending rates reached nearly 50% for commercial banks and very well over 75% for merchant banks. The result, therefore, should not be surprising. Ownership is also a positive determinant of distress, suggesting that government-owned banks tend to be more distressed. This agrees with our findings using descriptive analysis.

Just as in our descriptive analysis, 1995 data throw up more significant determinants of distress. This is not surprising, given that by 1995 the number of HABs had risen to 40. Our results indicate that highly capitalized banks tend not to be distressed, while merchant banks tend to be more distressed. Similarly, banks that earn higher net income tend to be healthy, while banks having higher rates of agricultural loans in their loan portfolio tend not to be distressed, suggesting that agricultural lending has less risk, perhaps because of other salutary conditions attached to such loans. Finally, the analysis of the 1995 cross-sectional logit model suggests that old generation banks tend to be more distressed. This may be because older generation banks tend to be government owned and government-owned banks tend to suffer from a greater degree of financial distress.

Table 8: Determinants of bank failure (cross-sectional data)

Variables	1993 Coeff	t-values	1994 Coeff	t-values	1995 Coeff	t-values
Constant	-0.18	-0.10	-0.04	-0.19	0.65*	3.55
Net income/Total assets	0.51	1.18	-0.05	-0.09	0.32	0.66
Net income/Equity capital	-0.11***	-1.87	0.002	-0.76	-0.3	-0.66
Interest expense/Total liabilities	0.24*	4.25	0.17*	3.28	-0.45	-1.27
Equity capital/Total assets	-0.43	-1.35	-0.08	-0.59	-0.30**	-1.94
Total loans/Total assets	0.06	0.33	0.006	0.37		
Bank type	-0.24	-0.29	-0.07	-0.69	-0.19***	-1.73
Whether quoted	0.79	0.77	0.15	1.15	-0.07	-0.56
Real estate loans/Total loans	-2.38	-1.26	0.73	0.65	1.80	0.94
Interest income/Net income	-0.001	-1.51	-0.0007	-0.23	-0.006**	-2.22
Demand deposits/Total deposits	0.17	0.92	0.14	0.72	0.20	1.07
Inter-bank deposits/Total deposits	-0.17	-0.73	-0.19	-0.94	-0.57	-1.60
Stabilization securities/ Govt. securities	-0.002	-1.07	0.02	1.00	-0.21	-1.54
Agric loans/Total loans	-0.40	-0.62	-0.56	-0.36	-2.28	-1.97
General commerce loans/Total loans	1.16	1.33	0.35	0.16	1.02	0.85
Ownership	0.22**	2.32	0.11	1.05	0.04	0.70
Generation	-0.05	-0.53	-0.13	-1.32	-0.35*	-3.21

Notes: * Significant at 1% level, ** Significant at 5% level, *** Significant at 10% level

For the panel data estimation, we dropped many of the variables that were not significant in any of the cross-sectional data estimations. The result agrees with most of what had been found earlier. Thus operationally inefficient banks, using costly funds, proxied by the ratio of interest expense to total liabilities, tend to suffer from failure (Table 6). Poorly capitalized banks tend to fail, while merchant banks, government-owned banks and banks not quoted on the stock exchange also tend to fail. The ratio of real estate loans to total loans is a positive determinant of failure. Conversely, the ratio of agricultural loans to total loans is a negative determinant of failure. These suggest that investment in real estate loans by banks has higher risk. Finally, old generation banks are more prone to failure.

Table 9: Determinants of bank failure (panel data)

Variables	Coefficients	t-values
Constant	-2.86*	-3.60
Interest expense/Total liabilities	0.79**	2.20
Equity capital/Total assets	-4.54*	-4.23
Total loans/Total assets	0.03	0.32
Bank type	-0.90**	-1.97
Whether quoted	1.62*	2.54
Real estate loans/Total loans	14.35*	-2.61
Agric loans/Total loans	-7.05***	-1.84
Ownership	1.72*	3.75
Generation	-0.96*	-2.10

Notes: * Significant at 1% level
 ** Significant at 5% level
 *** Significant at 10% level

6. Constructing early warning models of bank failure

On the basis of our critique of the CAMEL-based bank rating system now used in Nigeria as an early warning system (EWS) for determining bank condition, we constructed a modified composite rating scheme. We also constructed a candidate logit model-based EWS using subsamples of our data set. These two groups of EWS approaches, as well as the current composite rating scheme, are evaluated for their predictive power.

Modified CAMEL-based composite rating scheme

The weights attached to the different CAMEL factors were modified according to our critique of the current scheme. Thus, for capital adequacy the score is increased to 28 from 25. The capital to risk weighted asset ratio is increased to 24 from 15, while a leverage ratio of 4 points maximum is introduced in place of the adjusted capital ratio and capital growth rate.

For asset quality, the maximum score is 22 instead of the current 25. The non-performing assets to risk assets ratio has a maximum score of 14, while the reserve for losses to total non-performing loans ratio has a maximum score of 8.

The management factor now has new components. Fraud measured as a percentage of equity capital is given a maximum score of 4, while a trend factor capturing the previous quarter's or month's rating is given a maximum score of 10. Insider loans that should have been a measure of management as well as loan concentration are not used because of the difficulty of "truly" determining them. A low weight is attached to fraud because banks tend to renege on providing information on it to the regulatory authorities. Earnings and profitability are given a maximum score of 18, in contrast to the present value of 20. The components are now three instead of four: profit before tax to average total assets, total expense to total income, and profit before tax to equity capital. Finally, liquidity with two components, liquidity ratio and volatile liability dependence ratio, is assigned a maximum score of 18 instead of the current 15. The revised weights of the rating scheme are shown in Table 10.

The modified rating scheme outperformed the current rating scheme with fewer type I errors and no type II errors at all (Table 8). This means it will save costs by not placing healthy banks ahead for further examination when they do not need it. Besides, the modified rating scheme has a tendency to give distressed banks in the "unsound" and "marginal" categories lower scores. It also tends to give higher scores to healthy banks in the "sound" and "very sound" categories. The trend score introduced and the amended score for the risk-weighted asset ratio may have mainly accounted for this observation.

Table 10: Revised weights of CAMEL factors

Factor	Component	Component weight (%)	Factor weight (%)
1. Capital	(a) Capital to risk weighted assets ratio	24	28
	(b) Leverage ratio	4	
2. Asset quality	(a) Non-performing risk assets to total risk assets	14	22
	(b) Reserve for losses to total non-performing risk assets	8	
3. Management	(a) Fraud to equity capital ratio	4	14
	(b) Trend using the previous period overall rating	10	
4. Earnings	(a) Profit before tax to average total assets	8	18
	(b) Total expenses to total income	5	
	(c) Profit before tax to equity capital	5	
5. Liquidity	(a) Liquidity ratio	7	18
	(b) Volatile liability dependence ratio	11	
TOTAL			100

Table 11: Predictive power of the composite rating schemes, 1996 (percent of correct predictions)

	Current	Modified
Non-HABs	70.8	100.0
HABs	93.4	96.5
Type I error	7.6	3.5
Type II error	29.2	0.0

Logit model-based EWS

For the candidate logit model-based EWS, we need to make within-sample predictions and outside-sample predictions. We selected two sample sizes, $N = 64$ and $N = 80$. The former corresponded to the original stratified random sample size, while the latter is 85% of the size of the sample of banks that had adequate data for this analysis. We then estimated two models each for the sample size, one model containing all the variables of the panel data model of determinants of bank condition and the other containing only the

significant variables of the panel data model. While the models with $N = 80$ performed very well as models of determinants of bank condition, they performed poorly with very low predictive outside-sample power. Accordingly, the models with $N = 64$ were selected as the candidate EWS. In predicting HABs and healthy banks, the critical value of probability of failure was set, following Martin (1977), as the proportion of failed banks in the sample used for constructing the relevant EWS. For this exercise, panel data for four years, 1992–1995, were used to make predictions of bank condition at the end of 1996. The model generated in each case was used to predict bank condition for the entire population of banks in the evaluation of the out-of-sample predictive power. The respective model performance was used to evaluate its predictive power for within-sample predictions. Table 9 shows these models and Table 10 evaluates their predictive power.

Table 12: Logit-based early warning model candidates

Variables	Model 1		Model 2	
	Coefficients	t-values	Coefficients	t-values
Constant	-0.86	-0.37	-1.28	-1.37
Interest expense/Total liabilities	0.63	1.08	0.95***	1.82
Equity capital/Total assets	-9.22*	-3.70	-8.49*	-3.95
Total loans/Total assets	-2.23	-1.07	N.A.	N.A.
Bank type	-0.97	-1.10	-0.64	-0.72
Whether quoted	2.39**	2.17	N.A.	N.A.
Real estate loans/Total loans	15.53**	2.25	12.41**	1.99
Agric loans/Total loans	-10.19***	-1.62	-6.73	-1.29
Ownership	1.53***	1.70	0.20	0.26
Generation	-1.54***	-1.84	-0.97	-1.17

Notes: * Significant at 1% level
 ** Significant at 5% level
 *** Significant at 10% level

The predictive power of the EWS is lower than that of the rating schemes, particularly the modified rating schemes. However, its performance is better than the Uniform Bank Surveillance Screen (UBSS) adopted by the US Federal Reserve System in the mid 1980s, which recorded as high as 32.7% type I error rate. But it did not perform as well as the Financial Institutions Monitoring System (FIMS) instituted for the US Federal Reserve System in 1993, which recorded a 17.1% type I error rate (Cole et al., 1995). Also, the model performed better than the two variants of the models formulated by Gonzalez-Hermosillo et al. (1996). One of these variants had 38% type I errors, while the other had 75% type I errors.

Table 13: Predictive power of candidate logit-based EWS, 1996 (percent of correct predictions)

	Model 1	Model 2
A. Within sample		
Non-HABs	97.1	97.3
HABs	70.0	70.0
Type I error	30.0	30.0
Type II error	2.9	2.7
B. Outside sample		
Non-HABs	86.8	85.7
HABs	71.4	73.7
Type I error	28.6	26.3
Type II error	13.2	14.3

We recognize that it is possible to optimally generate CAMEL rating scheme weights using a loss function to evaluate the relative importance of the type I and II errors in such a way that the sum of the loss over the sample is minimized. Not adopting such a procedure in this paper is a limitation of the study that can be further explored as an area of future research. Sequel to this, it is also recognized that because banks with unrecognized "economic insolvency" can mistakenly be merged with "economically solvent non-HAB banks", there is a possibility that the coefficient t-values and out-of-sample predictions are more marginal than they would be otherwise. This is one of the limitations often associated with this type of model.

7. Effectiveness of bank supervision

This section looks at the effectiveness of bank supervision in Nigeria, particularly in relation to minimizing bank distress. In this connection, we provide a qualitative assessment of both pre-operation and post-operation banking regulation.

The extent of distress in the banking system in Nigeria appears to call to question the effectiveness of the pre-operation regulations of the system, particularly those relating to licensing requirements. Among these are regulations for satisfying minimum capital requirements; ensuring that board and management are made up of "fit and proper" persons (i.e., no bankrupts, persons of criminal records or fraudulent people. What is a fraudulent person? Do we mean persons convicted of fraud? are allowed to own or run banks); and prescribing ownership limit, e.g., individual ownership can be restricted to not more than 5% of paid-up capital.

The way the capital of most banks became eroded led credence to the feelings in the industry that many promoters of new banks exploited the loopholes in bank regulation in the way they contributed bank capital. A lot of them were believed to have financed their contributions using commercial papers and other similar money market instruments, which were paid back using depositors' funds once the banks opened. This made the actual bank capital rather fragile. It is no wonder then that in 1990, nine distressed banks required as much as 2.0 billion in additional capital to be able to operate in a safe and sound manner. This amount ballooned by a factor of 15, to 30.5 billion for 60 distressed banks by the end of 1995 (Alashi, 1997).

Besides, the issue of ensuring that only "fit and proper" persons constitute the board and management appears to be seriously in doubt. For example, Uchendu (1995) reported that the CBN had to delete the name of a chief executive of a merchant bank from its register of fellows in connection with fraudulent practices, among which were false claims of qualification and experience prior to being appointed. Similarly, current regulation does not deter people from owning a greater share than allowed by law through the use of fronts. Neither does it ensure that "strange bedfellows" do not populate boardrooms of banks. Boardroom squabbles and the resulting litigation can lead to defective management as well as poor credit administration policy. These are some of the major factors adduced by financial institutions as causing distress (CBN/NDIC, 1995).

To be effective in its post-operation regulation, the supervisory and regulatory authorities in Nigeria require adequate human and information capital. However, the human capital capacity of the regulatory authority appeared spread to its elastic limit with the liberalization of entry of financial institutions and the broadened span of supervisory control of the CBN by BOFID to include NBFIs. In particular, financial

institutions identified the lack of adequate supervision and inadequacy of professionally trained personnel as some of the major causes of distress (CBN/NDIC, 1995). To gain maximum benefit from the information capital of the banking system, both regulatory agencies and banks must have experienced electronic data processing (EDP) staff. In Nigeria, not only is this category of staff in the banking industry in short supply, the few that exist are highly inexperienced. Thus, NDIC (1991a) found that most EDP analysts in the industry have just over three years' experience, while most staff have less than five years' experience in high level languages, although the survey revealed that over 95% of EDP managers have over five years' experience. These will tend to limit the effectiveness of the post-operation supervisory capacity of the authorities in Nigeria.

Part of the measure of the effectiveness of bank supervision relates to the willingness of government to provide the enabling environment for the implementation of recommendations of the regulatory and supervisory agencies. Until January 1998, government appeared to lack the political will to implement the recommendations of the regulatory authorities relating to the resolution of distress. In that month the liquidation of 26 banks, made up of 13 each of commercial and merchant banks, was announced, together with the process the NDIC would take in paying depositors. With this development, Nigeria seemed to have taken the bull by the horns in implementing what is perhaps the single most important step for resolving bank distress. To do otherwise might send wrong signals to operators of the banking system.

The literature emphasizes the innovative handling of the issue of incentives at different levels in order to ensure the effectiveness of banking supervision. At the level of bank managers, it recognizes that the way compensation is structured can contribute to bank failure. If compensation is made proportional to profits, for example, managers might be tempted to take too many risks that can promote bank distress. Conversely, if compensation is a fixed salary, they will have no incentive to take risks, making them more conservative. This therefore suggests that examiners should look carefully at the approach through which top managers are compensated. Such compensation frameworks should not be too pro risk-taking.

In Nigeria, there appears to be anecdotal confirmation of this hypothesis. The old generation banks tend to pay fixed compensation while the new generation banks tend to adopt a combination of compensation tied to profit and/or share ownership. It is known that those banks that tie the compensation to share ownership tend to be sound or very sound banks, whereas those that tie compensation to profit performance tend to be distressed. This is not surprising because managers who operate under the environment of compensation tied to equity ownership will not take unnecessary risks that can corrode their share capital. However, the extent to which this anecdotal evidence is true requires rigorous empirical analysis.

At the level of bank owners, the literature recognizes that the existence of deposit insurance can give owners the incentive to take unnecessary risks. To counter this it recommends the design of appropriate pricing for deposit insurance. The extent to which this problem exists in the Nigerian banking system requires empirical investigation.

At the level of regulators themselves, the literature recognizes that providing appropriate incentives will make them implement effective monitoring followed by taking

appropriate action. The compensation structure of the supervisory and regulatory authorities in Nigeria is fixed and provides little or no incentive for the officers to take effective monitoring and implementation actions. A more rigorous analysis is required to confirm this fully, however.

Finally, at the political level, it might be worthwhile to consider whether there is a need to give incentives to politicians to implement the recommendations of the supervisory and regulatory agencies. One possible suggestion is to make it mandatory for NDIC to publicize the names of the people whose deposits would be unavailable as a consequence of bank failure and whose deposit insurance payments will not be available until the bank is formally closed. These will invariably be the elite, who more often than not will have links with the politicians.

The foregoing suggests that in terms of the necessary institutional and legislative framework for bank supervision, Nigeria is one of the leaders in sub-Saharan Africa. It appears that what is lacking is a mechanism for providing the necessary incentives for implementing decisions adjudged as painful. The extent of current incentives at the different levels of the system needs to be determined by more rigorous investigation before an acceptable and effective incentive system can be designed.

8. Concluding remarks

This study characterized the nature of banking distress in Nigeria and analysed the effectiveness of the approaches adopted by the country's bank supervisory agencies. It identified the characteristics and determinants of bank supervisory decisions in Nigeria and found that banks that are profitable and highly capitalized tend not to be distressed, while ownership and age of banks are also significant distinguishing characteristics of bank supervisory decisions. Thus, while more government-owned banks were placed under holding action between 1990 and 1992, more private banks have been failing since 1993. Also, a higher proportion of new generation banks failed than old generation banks. Similarly, banks not quoted on the stock exchange failed more. Holding action banks (HABs) were also found to be more engaged in risky lending, to have higher loan concentrations, and to make more provisions for bad and doubtful debts.

Using a critique of the CAMEL-based early warning system (EWS) currently in use, the model constructed and evaluated a modified CAMEL-based EWS and two candidate logit-based EWS models. The modified CAMEL-based scheme outperformed the current scheme with fewer type I errors and no type II errors at all. This means that the new scheme could help save costs by not placing healthy banks ahead for examination. Although the predictive power of the logit-based EWS models is lower than that of the CAMEL rating scheme, they did not perform poorly when compared with others of their type in the literature.

The study also found that Nigeria has the necessary legal and institutional infrastructure for the effective supervision and regulation of the banking system. Perhaps adequate provision of an enabling environment, including incentives for implementing the recommendations of the supervisory and regulatory authorities at the different levels of the system, is what is lacking. The study suggests that more rigorous assessments be conducted to determine the incentive schemes at the different levels of the banking system and that appropriate incentive packages for motivating performance be instituted.

Notes

1. Adverse selection is an asymmetric information problem that takes place before a loan transaction is undertaken. It occurs when lenders favour risky projects with potentially higher returns at the expense of genuine investment of lower returns but with higher probability of repayment. (See Soyibo, 1997: 8, and Mishkin, 1997: 30–31).
2. CAMEL is an acronym for Capital adequacy, Asset quality, Management quality, Earning ability and Liquidity.
3. The reduced-form equations used here tend to treat bank conditions as a latent variable and hence do not distinguish whether adverse movements in the economy or other determinants of bank conditions might soften the supervisory response of the examiners. The absence of an alternative proxy for modelling optimal supervisory response based on opportunity cost measures of bank distress, e.g., the unbooked cumulative loss of assets, is a limitation of the study. It is therefore acknowledged that the supervisory response can be better estimated structurally but the tardiness of appropriate proxies for supervisory response in Nigeria prevented this. What does *tardiness* mean here?
4. An alternative approach is to test for the *odds ratios* through models with logarithmic transformation of the variables in the right hand side (RHS) of the equation. If y is the odds ratio, such models are always of the following forms:
$$y = 1 + b \log(x_1/x_2) + c \log(x_3/x_4)$$

This can equally be expressed as
$$y = a + b_1 \log x_1 - b_2 \log x_2 + c_1 \log x_3 - c_2 \log x_4$$

The condition for which the equivalence holds is that the coefficient pairs b_1 and b_2 , and c_1 and c_2 do not differ significantly from each other.

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