FINANCE AND DEVELOPMENT RESEARCH PROGRAMME

WORKING PAPER SERIES

Paper No 13

**THE PREDICTION AND
DIAGNOSIS OF BANK FAILURES
IN ZAMBIA**

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February 2000

Abstract

The diagnosis and prediction of bank failures through the development of an effective early warning system is currently an important issue at the Bank of Zambia. The bank failures of the 1995 and 1997/98 brought into question the ability of the central bank to diagnose the financial condition of banks or act promptly in effecting remedial measures for failing institutions. This paper evaluates the method of financial analysis currently employed by the Bank of Zambia and considers the merits of a new method of analysis proposed to the Bank of Zambia by an external consultant. The paper makes recommendations on how to improve the diagnosis and prediction of bank failures by incorporating non-financial factors into the process of analysing bank performance. The objective of the paper is to provide a simple, non-econometric, yet practical policy instrument for regulators and supervisors in small developing countries.

TABLE OF CONTENTS

TABLES

FIGURES - ALMOST ALL AT END OF PAPER

1.0   INTRODUCTION

A recent review by the International Monetary Fund (IMF) revealed that 133 out of 181 member countries had experienced significant banking sector problems during the years 1980-1996 (Goodhart et al 1998), the most notable failures of the recent past being: Argentina, Chile, and Uruguay (1979-1983), the Nordic banking crisis (1987-1994), Japan (1992-), Mexico (1994) and more recently the Asian Financial Crisis (1997-) (Figure 1).

Figure 1   Recent banking problems around the world

Figure A1.1 Banking problems worldwide, 1980–96
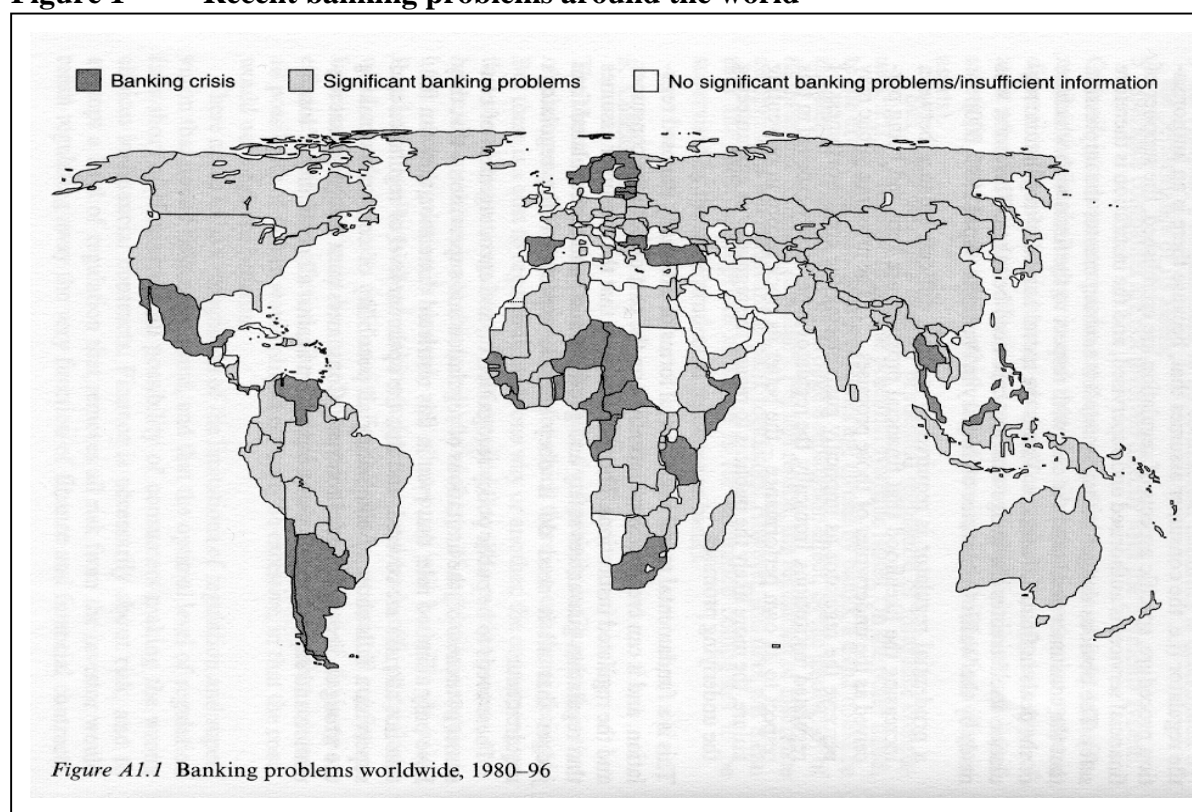
Goodhart et al (1998)

The increase in bank failures has rekindled the interest in early warning systems. Bank regulators in particular are attracted to the prospects of models that assist them predict banking distress in good time. With limited financial resources to determine the "safety and soundness" of a large number of financial institutions, regulatory authorities are appreciative of any kind of mechanism that can identify banks that are in financial difficulties (Altman, 1981). The diagnosis and prediction of bank failures through the development of an effective early warning system is currently an important issue at the Bank of Zambia. The bank failures of 1995 and 1997/98 brought into question the ability of the Central Bank to diagnose the financial condition of banks or act promptly in effecting remedial measures for failing institutions.

This paper evaluates the experience of the Bank of Zambia in analysing the performance of commercial banks in operation over the period December 1995 to March 1998 (Table 1). Excluded from the study are banks that opened during that period. Having just been opened, they do not portray typical banking ratios and do not serve any purpose other than to distort the ratios used in the study.

1

Table 1   Types of banks in Zambia

Foreign Banks	Local Banks	Failed Local Banks
Bank of China (1997) Barclays Bank (1918) Citibank Bank (1979) Stanbic Bank (1956) Standard Chartered Bank (1906)	Cavmont Bank (1993) Finance Bank (1988) First Alliance Bank (1995) Indo-Zambia Bank (1985) Invest Trust Bank (1995) New Capital Bank (1989) Union Bank (1979) United Bank of Zambia (1997) ZANACO (1968)	Chase Trust Bank (1995 - 1997) Credit Africa Bank (1994 - 2 Dec. 1997) First Merchant Bank (1994 – 2 Feb. 1998) Manifold Bank (1987- 5 Dec.1997) Prudence Bank (1994 - 17 Oct.1997) Meridien Bank (1984-1995)

Section 1 introduces the objectives and outline of the paper. Section 2 reviews the literature on early warning systems. It distinguishes between macroeconomic and microeconomic models. It also explores the application of strategic management tools and techniques in the prediction and diagnosis of bank failures. Section 3 evaluates the method of financial analysis currently employed by the Bank of Zambia and considers the merits of a new method of analysis proposed to the Bank of Zambia by an external consultant. Section 4 makes recommendations on how to improve the diagnosis and prediction of bank failures by incorporating non-financial factors into the process of analysing bank performance. Finally, Section 5 presents the conclusions of the paper.

2.0   EARLY WARNING SYSTEMS

To be truly effective and comprehensive, an early warning system must meet five important criteria. First, it must have the capability of signalling financial distress within an acceptable margin of error. Table 2 shows the two types of errors that can occur. A type I prediction error occurs when a bank fails whose failure was not predicted. A type II prediction error occurs when a model predicts that a bank will fail but it does not.

Table 2   Prediction ability matrix

	Failed Bank	Non-Failed Bank
Predicted Bank Failures	Correct Prediction	TYPE II ERROR
Predicted Non Bank Failure	TYPE I ERROR	Correct Prediction

Second, it must be able to monitor the internal and external economic environment, banking industry and bank specific conditions. A three pronged approach is required to identify bank problems and the degree of potential bank failures. To restrict an early warning system to the financial statements of a bank is to deny the high degree of influence that economic and political factors have on bank performance. Third, there must be a mechanism for co-ordinating and analysing information from many diverse sources. The process must integrate the use of other sources of information such as the bank's strategic plans and reliable press articles. Fourth, an early warning system must be able to account for any recent developments, since financial conditions change rapidly. Developments in the banking sector are taking place at an increasingly rapid pace. Unless the model acknowledges this fact, there

is a danger of constantly and consistently reacting to market developments rather than pro-actively anticipating them. Lastly, the early warning system must have a response procedure to allow for the revision and updating of information when needed and to prevent false alarms. It must be an on-going monitoring process so that it becomes an integral part of the regulatory process.

2.1 Macroeconomic models

The primary objective of macroeconomic studies is to identify those characteristics in the economy that are most likely to result in banking distress and possible bank failures. The majority of macroeconomic models are concerned with financial crisis in general with a bias towards currency crisis as opposed to banking crisis. The early models made a distinction between financial crisis brought about by balance of payment problems and those that were essentially systemic banking crises. It is not until the late 1990's that models really started to merge factors relating to both balance of payment problems and systemic banking crisis problems. The indicators that are most commonly used in macroeconomic models include cyclical output, trade shocks, asset prices, interest rates, inflation, foreign exchange reserves and capital flows.

Kaminsky and Reinhart (1996) undertook one of the most comprehensive empirical macroeconomic studies on early indicators of banking distress. The indicators used in the empirical work included export growth, real exchange rate deviations, terms of trade changes, changes in reserves, money demand/supply, real interest rates, M2 money multiplier, M2/international reserves, growth in domestic credit/GDP, changes in stock prices, output growth and banking crises. The study found that, on average, all the indicators sent the first warning signal anywhere between twelve and eighteen months before the crisis occurred, with the real exchange rate offering the longest lead-time. Overall, external sector variables and those variables linked to financial liberalisation provided the most accurate signals before the crises. The model, however, was criticised for failing to offer a systematic way of combining the information generated by the model. As the indicators were assessed individually, the possibility of conflicting signals was high. Preliminary results of subsequent models (Kaminsky and Reinhart, 1997, 1998) that integrate these indicators into single variables have not performed as well.

While macroeconomic models are helpful in understanding why bank failures occur in the macro context, they are of limited practical use to bank regulators monitoring the performance of individual banks. One of the weaknesses of these models is that they fail to explain individual bank failures. By focusing on general factors, they are unable to provide an explanation of the causes and timing of individual bank failures.

2.2 Microeconomic models

Microeconomic studies focus on individual bank statistics of performance. They aim to discern commonly predictable patterns and trends in these statistics for use in predicting future banking failures. The ratios used reflect the position of a bank relative to its capital, asset quality, management, earnings and liquidity. The microeconomic models for the prediction of distress are classified as either problem prediction models, outlier/ peer group models or failure prediction models (Sinkey, 1979).

Problem prediction models replicate and predict bank examiners' "problem bank" classifications. The classifications are generally based on the quality of a banks loan portfolio. High volumes of substandard loans relative to capital and reserves, have an adverse impact on bank performance, and raise the attention and concern of the regulatory authorities. The classification of a bank as a "problem bank" does not mean in itself that a bank is going to fail, rather that it problems may lead to failure if not attended to. Outlier prediction models, sometimes referred to as Peer Group Models, focus on statistical differences between banks. Once regulatory authorities establish benchmark measures of bank vulnerability, based on the industry average performance, such models identify banks with outlier characteristics as being in need of supervisory actions.

Failure prediction models focus on identifying factors that lead to the seizure or complete failure of institutions operations. The absence of a conceptual theory about corporate failure has led to diverse definitions and interpretations of what constitutes failure. Difference in definition naturally leads to different designs of the "optimal" failure prediction model. Beaver (1968), for example, operationalised failure as having taken place when one of the following occurred; bankruptcy, preferred stock dividend arrears, bond default, and having an overdrawn account. Other researchers have restricted their definitions of failure to include only those firms that have experienced insolvency or liquidation proceedings. Despite the different definitions of failure, the failure process is characterised by a systematic deterioration of the values of the ratios. The research into the use of ratios has, therefore, centred on identifying the ratios with the most markedly different behaviour patterns prior to failure, and deciding how best to incorporate the selected ratios into a formal failure prediction model.

A fundamental assumption with univariate models is that the distribution of the selected ratios differs significantly between those firms heading for failure and those that are not - a difference that can be exploited for predictive purposes. Univariate models have the potential to give conflicting predictions or indications about an institution's future because individual ratio trends may be heading in different directions. Multivariate analysis is a direct attempt at dealing with this problem. Multivariate financial analysis combines different ratios, usually by some form of weighting, to produce a single index. Altman (1968) pioneered the work into the use of multivariate statistical analysis. A number of research studies in the 1970's concentrated on developing his initial accounting models. Foster (1978) identified the important issues of investigation at the time as being either deciding what form the model should take, deciding what variables should be included or deciding what weights to apply.

The research by Rojas-Sarez (1998) is a recent study, which adopts a typical microeconomic approach. She used bank level indicators based on the CAMEL model to evaluate bank failures in developing countries. She concluded that the CAMEL indicators were not good measures of bank strength in emerging countries. What were required for them were simpler alternative measures that were more appropriate to the unsophisticated nature of developing countries. She recommended the use of four basic indicators, namely, deposit interest rates, the spread between lending and deposit rates, the rate of credit growth and the growth of the inter-bank debt. While these measures may be considered inadequate for identifying systemic weaknesses of the banking sector, they are adequate for identifying individual bank weaknesses. This criticism is in light of the use of banking system averages as warning thresholds for individual indicators of bank risk (Demirguc-Kunt & Detragiache; 1999). The difficulty for academics in utilising these models for research is that of obtaining data on individual banks, especially in developing countries. The required data on individual banks

is often confidential, outdated or simply not of a comparable nature with other commercial banks.   Where a study intends to examine a number of countries, differences in accounting principles, standards and definition of ratios means that comparative studies may be misleading.

2.3   Integrated models

Most studies in the economic literature treat macroeconomic indicators and microeconomic indicators of banking distress separately. Few studies seek to combine both these indicators into one integrated model of analysis, and even fewer studies attempt to incorporate non-quantitative factors into the process of analysis.

Honohan's (1997) paper on the diagnosis and prediction of banking system failures in developing and transitional countries was a very systematic evaluation of both macro- and microeconomic indicators of bank failures. The macroeconomic indicators were based on aggregate balance sheet data and included the growth in aggregate lending, the loan to deposit ratio and the ratio of foreign borrowing to total deposits. The model used the same ratios in the assessment of microeconomic indicators of bank failures. Indicators for government involvement included government share of lending, central bank refinancing of bank lending and the size of the government deficit. The primary advantage of this model is that it acknowledges the importance of both macro and micro indicators of bank failures.

However, its methodological approach limits its effectiveness as a practical early warning system. It is highly dependent on ex-ante knowledge of the likely structural nature of the next banking crisis before the selection of the appropriate indicators to use – macro, micro or government. In addition, there is a potential for conflicting results when conducting single country studies with the model. The model offers no criterion for deciding the importance or weighting to attach to the different indicators.

The study by Gonzalez – Hermosillo (1999) attempted to deal with the above shortcomings. She undertook a macro and micro empirical exploration of some recent episodes of banking distress in order to identify ex-ante determinants of banking distress. The study made two important contributions to the literature on early warning indicators of banking failures. Firstly, it focused on banking distress as opposed to actual bank failures. This approach is useful in that it gives regulators a greater period within which to implement remedial action, if necessary.

The second novelty was in re-specifying the traditional macro and micro indicators of bank failures in terms of the different types of bank risk, namely, liquidity risk, market risk and credit risk. Apart from utilising proxies for these risks, the model included proxies for moral hazard (ratio of insider loans to total assets, ratio of interest income on loans, fees and leases to total assets). By focusing on these risks, instead on the specific indicators, the study was able to conduct comparative analyses of different countries. Different ratios for different countries can be used as long as they capture the same risks. The study found that both macroeconomic and microeconomic factors were important in the determination of banking fragility.

2.4   Strategic management models

The Gonzalez-Hermosilo study, despite its credible efforts at developing an integrated

analytical framework, retains the same fundamental weaknesses of economic models in the study of small developing countries. They typically utilise a large sample of countries with a large number of banks in their economies. In order to attain statistical significance, a sufficiently large sample of healthy and failed banks is required. Comparable data for both sets of banks must also be available for a meaningful econometric study. Unless the country has experienced a number of episodes of bank failures, it is difficult to rely on time series data from one country.

Most importantly, economic models tend to downplay the role of management in the financial distress and failure of banks. Bank supervisors and academic researchers acknowledge the importance of management actions as indicators of corporate failure. However, it is difficult to assess objectively the management skill and expertise of bank managers. How can a bank regulator determine whether a bank manager's knowledge, experience, judgement, reputation, character and diligence (or lack of it) will lead to the failure of a bank? Direct assessment of these qualities requires skills that few bank regulators have. Many bank regulators resort to indirect methods of assessing management quality. Working on the assumption that efficient managers keep costs to a minimum, enhance the profits of the bank and its ability to survive in a competitive environment, researchers use efficiency ratios as alternatives. Pantalone and Platt (1987), for example, selected four ratios for this purpose: (1) interest expense/total liabilities, (2) interest on deposits/net income, (3) compensation/total expense, and (4) occupancy expense/total expenses.

Though useful, such ratios identify symptoms of managerial deficiency rather than establish the reasons or causes of that deficiency. This paper suggests that one method of resolving this problem is incorporating strategic management tools of analysis into the study of bank failures. There are numerous studies in the strategic management literature that explore the link between the quality of management and corporate performance. Kay (1993) traced the use of corporate strategy models to the 1960's. Typically growing out of the budgeting process, the early models normally covered revenue and expenditures projections into the future. More sophisticated planning procedures were then developed to take into account the firm's expectations of economic growth, probable developments in the market, and its own plans and intentions. The techniques for analysing and developing corporate strategy are many and varied. It is not the intention of this study to pit one against the other. It is, rather, by selecting five of the basic models in the literature, to illustrate that strategic management models are useful in the design and use of early warning systems by the Bank of Zambia.

2.4.1   Porters Five Forces Model (1979)

Porter (1979) stipulated that the nature and degree of competition in an industry hinges primarily on five forces: the threat of new entrants, the bargaining power of customers, the bargaining power of suppliers, the threat of substitute products or services, and the level of competitive rivalry amongst industry participants. The model presents a framework for a structured analysis of the banking industry. It represents a concise analytical tool with which bank regulators can identify the important competitive issues facing the industry faced with, and, subsequently, identify those banks that are pursuing inappropriate strategies in dealing with them. Porter's five forces model has been criticised for not providing an objective mechanism by which to determine the intensity of the five forces, either individually or collectively. Nevertheless, the model does provide a basic framework within which to examine the forces affecting the banking industry. Determining the intensity of these forces,

though a subjective process, can still be done to the extent that it is helpful in prioritising the key issues that bank managers should be dealing with.

2.4.2   Porters Generic Strategy Model (1981)

Determining the appropriateness of a strategy to a given market environment requires an understanding of the strategic options available to management. Porter (1980) operationalised the strategic choices of corporations into three generic choices - cost leadership, differentiation, and focus. Each of these strategic choices bears certain risks, for which a bank must be prepared. A cost strategy is hard to sustain as competitors can easily imitate the strategy. Thus, for example, when a number of small choose to pursue this strategy in a market that is price sensitive, regulators should be concerned. However, not every bank capable of successfully following a differentiation strategy. The additional cost of adding service attributes, the risk of customers deciding they do not want the extra features, and the cost of continual product innovation may prove financially onerous for a bank without adequate financial resources. Similarly, banks pursuing a focus strategy without adequate safeguards to protect themselves against the risks associated with such a strategy place themselves at the risk of failure. Banks focusing on specific types of customers, like farmers for example, or specific types of loans like real estate loans, expose themselves to the cyclical risks associated with those business segments.

2.4.3   Boston Consulting Group (BCG) Matrix

Portfolio strategy analysis is useful for regulators interested in establishing which of the banks that they supervise have unbalanced product portfolios. Banks with a relatively larger proportion of unprofitable products are candidates for failure. Management that continues to invest in "problem" products, which continually fail to deliver profitable returns, may create an unwarranted liquidity problem for the bank. By monitoring the changing portfolio structure of a bank and matching it to the profitability of different investment avenues, the regulators can easily notice the likelihood of banks experiencing declining income levels due to an unbalanced portfolio.

2.4.4   Igor Ansof Product –Market Matrix (1984)

Igor Ansoff (1984) stipulated that a business could elaborate its activities in a number of ways. It can develop its market geographically or through new customers, or it can simply push the same products in the same markets. Like the portfolio strategy matrix, the product-market matrix is useful for regulators interested in identifying banks with inappropriate product-market portfolio strategies. In a tightly contested market, smaller banks, without adequate financial resources to compete favourably with the larger banks, should pursue new markets rather than try to penetrate an existing market. Management that continues to invest in a saturated market may lead a bank to failure.

As is the case with models based on classifications and categorisations, the key limitation this model is faced with is a definitional one. Sometimes, it is not clear whether a firm is pursuing a new market or merely penetrating an existing market. Likewise, with its products, when does the augmentation of an existing product lead to the creation of a new one? Nevertheless, as long as the researcher ensures that the definitions of products and markets are clear and uniformly applied, there is no reason why this model should not be a useful tool in the diagnosis and prediction of bank failures.

2.4.5   Environmental Analysis

Using strategic management models as techniques in the diagnosis and prediction of corporate failure requires that an analyst also takes into account environmental factors. Banks, like any other business, operate within the greater economy and their political and economic environments affect their performance. The political structures and traditions of a society are an important influence on the vulnerability of the banking system as a whole, and of individual banks. Honohan (1997) identified the two dimensions of political influence as the degree of concentration of political power in elite groups, and the freedom of the press. In practice, political indicators may be construed either through direct measurement of such political structure, or by relying on political judgmental risk indicators marketed by commercial firms.

Economies in developing countries tend to be more volatile than in industrial countries. Sharp fluctuations in real economic growth, inflation, nominal and real exchange rates, and nominal and real interest rates can disrupt the operations of even the most sound banks, especially those banks whose portfolio reflects the undiversified nature of the economy. As is the case with political indicators, establishing industry wide indicators of financial distress for economic variables is not easy. Much depends on the specific asset and liability structure of the bank balance sheet at a given point in time. This, in turn, is dependent on the bank management's expectations of future inflation and interest rates. For example, a rise in interest rates will result in an increase in interest rate income for a bank with more sensitive assets than liabilities. A negatively gapped bank will see a fall in interest rate income, which may, ultimately, lead to a substantial and unabated fall in profits and, eventually, failure.

3.0   THE DIAGNOSIS AND PREDICTION OF FAILURES IN ZAMBIA

Following the 1995 and 1997/8 bank failures, the Bank of Zambia came under severe criticism for its handling of the banking failures. Because the bank failures of 1995 and 1997/8 did not occur suddenly, the Bank of Zambia was criticised for not acting promptly in dealing with the affected banks. It was the general perception of the public that it was the responsibility of the Bank of Zambia to prevent bank failures from occurring. Critics argued that the failures were a culmination of a long process of mismanagement, breaches of the law and financial deterioration. The public felt that the Central Bank was aware of the financial problems and violations of the law of the failed banks yet it failed to taken any action.

3.1   The Bank of Zambia

The Bank of Zambia (BOZ) is at the helm of the regulatory structure in Zambia. During the 1970's and the 1980's, the ability of the BOZ to effectively regulate and supervise the banking sector was severely constrained by the political philosophy of the socialist government of the time. The primary responsibility of the central bank, at the time, was directed at ensuring the compliance of financial institutions to the controls relating to foreign exchange, domestic credit and interest rates. The Bank of Zambia neglected the supervision of commercial banks as the banking sector was dominated by subsidiaries of foreign banks whose home regulators were relied upon to monitor the performance of the branches based in Zambia.

In line with the changing structure of the financial industry and the general economy since liberalisation in 1991, the BOZ underwent a series of restructuring programs. With the

support of the United Nations Development Program (UNDP), the BOZ undertook a number of capacity building activities to improve the efficiency of the financial system. All retail sales to individuals were, henceforth, handled by commercial banks. An important area of reform was the strengthening and upgrading of the capacity of the Financial System Supervision Department. This included the training and development of staff through local and foreign seminars and courses (both short term and long term). Because of the publicity that the bank failures attracted, the capacity building exercises earmarked for the Financial System Supervision Department received priority.

3.2   The Financial System Supervision Department

The Bank of Zambia created the Financial System Supervision Department (FSSD) in 1974. Before 1992, it did not undertake any off-site analysis. Instead, on-site inspections were the only supervisory tool employed (Mwape: 1997,5). In addition, banks were not required to submit any prudential returns other than those required for monetary policy. The focus of the FSSD was on checking compliance with foreign exchange controls and other commandist economy regulations. There was heavy reliance on direct controls, such as ceilings on interest rates and lending of banks, for monetary policy purposes. This approach was acceptable at the time because the majority of commercial banks operating in Zambia were subsidiaries of reputable international commercial banks, which were subject to consolidated supervision by home country regulators. Thus, through liaison with these supervisory authorities, it was relatively easy for the BOZ to monitor the banks' financial condition and performance (Mwape: 1997, 6).

In 1994, a year before the first bank failures, the FSSD comprised four members of staff who conducted quarterly analyses of all banks in the industry. Banks only provided four financial returns: the profit and loss statement, balance sheet, liquidity return, and statement of capital. These returns were received quarterly and had no legal backing. The department only inspected institutions once a year and, consequently, any problems arising were not noticed until the next round of inspections, often too late for any corrective action to be taken.

Such inspections only provided an appreciation of the condition of a bank as at a given date without the necessary backup of continuous monitoring of potential risks arising at the bank. However, with the increasing number of financial institutions entering the sector, this approach was clearly inadequate. The need to re-examine the regulatory framework to suit the changing environment was unavoidable.

Following the enactment of the Banking and Financial Services Act, 1994 (BFSA), the BOZ underwent further transformation. The BOZ received new legal powers to licence, regulate and supervise commercial banks. The number of off-site Bank Inspectors also increased to thirteen, reflecting the increased responsibilities of the FSSD. The FSSD also began to rely on both off-site and on-site supervision techniques of regulating and supervising commercial banks, the former being reliant on traditional ratio analysis while the latter involved annual inspections by officers from the BOZ.

Despite these actions undertaken by the Central Bank, the country suffered its first major banking crisis in 1995. Three commercial banks collapsed and many depositors lost their money. Two years later five more banks collapsed. Bank of Zambia seized Prudence Bank on 17 October 1997 followed by Credit Africa Bank on 2 December 1997, Manifold Investment Bank on 5 December 1997 and First Merchant Bank on 2 February 1998.

The BOZ responded to these failures by prolifically issuing new banking regulations. Statutory instruments were issued for capital adequacy, insider loans, large loans, fixed assets, interest disclosure, classification and provisioning of loans. A committee was also set up to review the entire BFSA. In addition to these legislative developments, the Department continued to improve the off-site supervisory and monitoring techniques. The Financial Analysis Unit in the department executes well-focused analyses of banks on their micro-prudential operations. Broadly, this analysis uses monthly quantitative prudential returns, reports and other qualitative information submitted by the banks. Thereafter, these submissions are financially analysed and checked for compliance to regulations and other provisions of the BFSA. This was established with the view of providing an early warning system with respect to the developments of fundamental weaknesses in the prudential state of a bank or financial institution.

3.3   The BOZ CAMEL MODEL

In January 1996, the FSSD improved the off-site monitoring system by adopting the CAMEL method of financial analysis, developed in the United States of America, which employed traditional ratio analysis in its approach. CAMEL is an acronym for the Federal Bank regulatory agency uniform Interagency Bank Rating System signifying five areas that are evaluated when rating a bank, as follows: C-Capital; A-Asset quality; M-Management; E-Earnings; L-Liquidity. A bank inspector undertakes the analysis of each bank. Once the individual reports are completed, one of the bank inspectors prepares an industry report to determine the state of the industry.

The ratios used as indicators of financial performance have traditionally been categorised into four component activities of a bank, namely, capital adequacy, asset quality, earnings, and liquidity. The capital of a bank acts as a cushion to absorb shocks. Researchers view the deterioration of capital relative to its assets, as an indication of possible financial difficulties. Gonzalez - Hermosillo (1997) found that even though failed banks in Mexico had capital ratios in excess of the Bank of International Settlement of 8%, they had significantly lower ratios than non failed banks during the same period. An important indicator of failure, impinging on the capital requirements of a bank, its earning performance and liquidity position, is its asset quality. Banks with a high proportion of non-performing loans to total loans are forced to make higher provisions for loan losses, thereby reducing net earnings and, ultimately, capital. The relevant ratios often used to distinguish between failed and non-failed banks include: non performing loans to total assets, non performing loans to total loans and the allowance for loan losses to total loans.

In general, sustained high levels of profitability should enable a bank to boost its capital and improve its economic performance. There is a negative relationship between profitability and the probability of failure. However, because exceptionally risky projects are associated with outstanding rates of return, a high degree of profitability for a certain given period may actually be positively related to the probability of failure. Different measures of profitability are used- return on assets, return on equity, and the net interest margin. A large volume of liquid assets allows a bank to meet its short-term liabilities and unexpected withdrawals of deposits. Hence, a high liquid assets ratio is negatively correlated to its likelihood of failure.

FIGURE 2   THE BOZ CAMEL MODEL

In its present form, the CAMEL model is an outlier performance model (Figure 2). It is not a failure prediction model, as it does not attempt to identify a definitive period of failure. Neither is it a problem prediction model as no formal provision currently exists to classify banks into performance groups. Instead, the model only flags off banks whose performance ratios deviate from industry averages. The monthly bank and industry reports refer to vulnerability, without establishing to a likely period of failure.

The CAMEL approach is primarily a ratio based financial model that incorporates only bank specific factors. The analysis reports make little mention of industry wide and environmental factors. Political, economic and bank strategy indicators have not been the subject of formal routine analysis by inspectors of the bank.   The nineteen ratios used in the model focus on bank performance with respect to capital, asset quality, earnings and liquidity. Before an inspector forms an opinion on the overall condition of a bank, each of the nineteen ratios is analysed and interpreted individually, in accordance with the definitions provided in Appendix 6.1. No explicit mechanism exists to consolidate the ratios into a single measure of performance, against which to compare the performance of other banks in the industry. The model does not classify banks into different "peer groupings" for analytical purposes. Opponents to this approach argue that such a ranking is not particularly useful in Zambia, given the small size of the industry.

The choice of ratios, discussed in Appendix 6.1, is a culmination of the initiatives of individual inspectors of the Department and reflects recently introduced statutory ratio limits. Non-financial variables have been included in the monthly and industry reports largely at the discretion of inspectors responsible for preparing those reports. In the absence of a rating system, the model provided no predictive testing criteria. Instead, analysis of the model's usefulness proceeded by graphing the ratios in each category - capital, asset quality, earnings, and liquidity.

Of particular interest to this study is the significant difference between the failed local banks and those that did not fail in the capital ratios in Figure 3. The failed banks show a greater weakness in their capital adequacy levels compared to the two other categories, sometimes as early as nine months prior to failure. The tier one and total risk based capital ratio differences for the three groups indicated that at least twenty one months prior to closure, the financial ratios of the failed and non failed banks appear to have been markedly different.

Figure 3   BOZ CAMEL capital ratios

Figure 4   BOZ CAMEL asset quality ratios

Figure 5   BOZ CAMEL earnings ratios

Figure 6   BOZ CAMEL liquidity ratios

Figure 4 indicates that the non-performing loans to total assets ratio and non performing loans to total loans ratio reflected differences between failed and non-failed banks nine and six months before failure, respectively. There was, however, a marked difference in the level of provisions made for non-performing loans relative to the total loans portfolios of the two groups. However, the ratios obtained under the asset quality category must be treated with caution. Following the introduction of the Classification and Provisioning Regulations in 1996, there was a lot of agitation about the levels of provisions required for past due loans. Some banks implemented them fully; others were given exemptions from certain requirements, while others simply ignored them altogether. The uniformity of the ratios obtained for the different banks can, thus, not be ascertained.

As indicators of potential failure, the return on assets and the interest margins perform better over the twenty-four months period than the return on equity ratio. The latter's variability, shown in Figure 5, is possibly a result of a combination of deteriorating capital levels and variations in the reported profits relative to that capital. As with the asset quality ratios, the degree to which the reported profits were affected by the agitation, caused by the levels of provisions required by the introduction of the Classification and Provisioning Regulations, has not been ascertained. The probability of creative accounting being used by banks to report artificial profits can not be ruled out either.

The most significant visual mean difference between the non-failed local banks and those that did fail is the liquid assets ratio shown in Figure 6, confirming the oldest rule of thumb in the business - it's not your profits but your cash that matters. As early as twenty-four months prior to closure, the failed banks had liquid assets ratios of less than 50%. From 52%, the ratio consistently declined over the twenty-four month period to 25% at the time of closure, averaging 30% over the entire period. This is in sharp contrast to the 75% average maintained by the non-failed local banks. The gross loans to total deposits ratio also reflects a significant difference in means that is clearly noted in Figure 6. There is, however, no observable difference in the total deposits to total assets ratio between the two groups. This, perhaps, suggests that even though the liquid assets ratio was markedly different, the non-failed banks were just as vulnerable to liquidity problems in the event of a run on the banks.

The advantage of the CAMEL model is that it highlights the key aspects of a bank that an analyst should be interested in - capital, asset quality, earnings and liquidity. For off-site analysis purposes, it also offers the flexibility of selecting the most appropriate ratios that a regulatory authority, such as the Bank of Zambia, feel are most applicable to its own financial environment. The model simply offers a framework within which to select the appropriate ratios and specify the standards against which to evaluate the performance of an individual bank, as well as the performance of an industry. However, given the manner in which the Bank of Zambia implemented the model, it offers nothing more than a convenient classification of different ratios under suitably designated titles. It leaves room for subjective analysis and interpretation. Where a number of Bank analysts are responsible for different institutions, such subjectivity may not facilitate a fair and objective assessment of the industry as a whole.

In addition the FSSD faced several problems in implementing the model. First, at the time of implementing the model, the information submitted by commercial banks was inadequate for substantial financial analysis. The Bank of Zambia received a limited number of prudential returns from commercial banks. In addition, some of the banks had a tendency to delay the

submission of some of the prudential returns. Second, the absence of a standard approach in the treatment of a number of accounting practices, such as the provisioning of loans, reduced the comparative value of the ratios computed. Third, the FSSD staff could only compute a limited number of ratios, due to the lack of adequate financial information, and a non-standard approach in the preparation of financial statements. Fourth, no industry benchmarks were set and agreed upon for all the selected ratios as indicators of bank performance. Except for those ratios with international set guidelines, like the capital adequacy ratios, no benchmarks have been set for the individual ratios used in the model to act as trigger ratios. For a long time, it is up to the individual desk officer for the bank to make an informed decision as to the acceptability of the level of a given ratio. Fifth, the absence of a standard rating mechanism increased the level of analysis subjectivity. Such a mechanism would, ideally, take into account, amongst other factors, the nature of business of the bank, its relative size and the types of customers. Each of these factors can influence the inter-industry comparison of performance results by means of ratios. Yet the current method of analysis ignored the different attributes and nature of business of the commercial banks in the industry.

Finally, the off site department was seriously understaffed at the time, with very limited operational resources. Each inspector was responsible for an average of five commercial banks, and a substantial part of the data capture process was manual.

Despite these problems, the CAMEL model greatly assisted in providing a uniform manner in which to analyse the performance of commercial banks. More importantly, it helped identify the problem banks in the industry and enabled the BOZ to implement some corrective action in the banks that required it. The exercise also assisted the department in identifying specific areas of the regulatory and supervisory process that required further attention.

3.4   Proposed amendments to the BOZ CAMEL model

In 1998, the FSSD engaged the services of a consultant to revise the CAMEL model. The report, recently submitted to the Bank of Zambia (Montgomery, 1998), by the external consultant, recommends the use of a ratio based model similar to the one currently in use. It includes, however, the additional feature of performance benchmarks and a rating system for ranking individual bank performance.

The Proposed Early Warning System (PEWS) is a typical problem prediction model designed to classify banks according to their level of performance as dictated by pre-established benchmarks. Banks are classified as either "satisfactory", "possible emerging problem", "watch" or "problem", depending on the composite score they attain after amalgamating each of the individual capital, asset quality, earnings and liquidity ratios calculated. The key objective of the model is to identify deteriorating financial conditions and characteristics of a bank's performance that may need further explanation.

Like the CAMEL model in use, the PEWS focuses on bank specific factors as indicators of possible failure (Figure 7). It makes no mention of industry factors, or of environmental variables in the model, nor is there any provision for comparison to industry average performance of any of the ratios. All analysis of bank performance is solely based on pre-set ratio benchmarks. No criterion for the revision of these benchmarks has been given in the consultant's report.

Figure 7   The proposed early Warning System

The fourteen ratios selected for the model are based on a bank's capital, asset quality, earnings, liquidity, foreign exchange, and deposit trends. The ratios are detailed in Appendix B. Unlike the CAMEL Model, the PEWS has an explicit mechanism for consolidating the ratios of a bank into a single composite score against which the performance of a bank may be judged. The consolidation process follows three steps. Each of the fourteen ratios is given a rating on a scale of one to five, in accordance with the benchmarks indicated in Appendix 6.2. The ratio's rating within each performance category, such as capital, for example, are then aggregated to arrive at a single rating. Finally, all the performance category ratings are aggregated to arrive at the bank's composite rating, and its classification defined in accordance with that rating as indicated in Table 3. The aggregation of ratings is done on the assumption that the individual ratios are equally weighted amongst themselves, and also that the different categories of a bank's performance are equally weighted.

Table 3   PEWS composite ratings

COMPOSITE RATING	DESIGNATION
1.0–2.0	Current condition satisfactory
2.1- 2.5	Possible emerging problem
2.6 – 3.5	Watch
3.6 and above	Problem

The PEWS does not rank the banks in Zambia into any kind of peer groupings because of the lack of a database with comparable information upon which such groupings can be built. It is expected, nevertheless, that the peer ranking will evolve as the system develops and improves. The choice of ratios, like the benchmarks associated with them, was determined by the consultant on the basis of work he has undertaken in other African countries. No formal provision has been made in the model to discuss non-financial variables, except to the extent that it is necessary to explain the financial results obtained in the model.

The application of the predictive ability matrix on the PEWS model yields very interesting findings for analysis. Using the "problem" classification as an indicator of likely failure, the percentage of misclassification for each of the eight quarters, prior to the failure of the five banks, was calculated and the detailed results are presented in Appendix 6.3 and summarised in Table 4 below.

Establishing the appropriate benchmark for judging the predictive ability of the model on the basis of these results is a very subjective process. What margin of error is acceptable? Foster (1978) observes that some studies, using an equal number of failed and non-failed companies, have generally used a random benchmark of 25%, as shown below. This means that if the total number of Type I and Type II errors do not individually exceed 25% of the total number of classifications, then the model is presumed to be satisfactory.

Table 4   PEWS summary of misclassification results (A)

Months before Failure	Number of Type I Errors (%)	Number of Type II Errors (%)	Total Number of Errors (%)
3	0 (0)	2 (13)	2 (13)
6	0 (0)	1 (6)	1 (6)
9	2 (13)	1 (6)	3 (19)
12	3 (19)	3 (19)	6 (38)
15	3 (19)	3 (19)	6 (38)
18	2 (13)	1 (6)	3 (19)
21	3 (19)	3 (19)	6 (38)
24	3 (19)	2 (13)	5 (31)

Table 5   PEWS summary of misclassifications results (B)

Months before Failure	Number of Type I Errors (%)	Number of Type II Errors (%)	Total Number of Errors (%)
3	0	5 (31)	5 (31)
6	0	6 (38)	6 (38)
9	0	6 (38)	6 (38)
12	0	5 (31)	5 (31)
15	0	5 (31)	5 (31)
18	0	6 (38)	6 (38)
21	0	5 (31)	5 (31)
24	0	9 (56)	9 (56)

Unfortunately, when this approach is used, it is assumed there is a 50% probability of failure amongst the firms in the industry. Such an assumption is uncharacteristically high for any meaningful failure prediction model. In the absence of known prior probabilities of failure in the Zambian banking industry, it would be misleading to judge the model on the basis of the absolute error percentage values recorded. Nevertheless, a number of useful observations were made:-

The percentage of "problem" misclassifications of the model increases from 31% twenty-four months prior to failure, to 38% nine months later, and then further decreases to 13% in the preceeding three months. This trend appears to be dictated by a combination of two factors. Firstly, the failed banks improved their performance in the interim period leading up to their exclusion from the problem list. Secondly, the deterioration in the performance of some of the banks that did not fail led to their temporary inclusion on the "problem" bank list. The exclusion of all Type I errors when the basis for failure classification is raised to include "Possible Emerging Problem" banks is a credit to the model. It means that at no time are any of the failed banks ever classified as satisfactory in performance. Yet, this was at the expense of increasing the Type II errors. Two possible explanations are available for interpreting these results. The first is that the model's rating scale is too stringent, thus unnecessarily including banks without "possible emerging problems" on its list of banks requiring

additional supervisory attention. The second is that banks actually did have problems which, though not terminal, warrant such classifications.

These results were discussed with a number of inspectors of the bank, and the general consensus was that the latter explanation had more credence than the former. In other words, the classification of some of the banks that did not fail as "possible emerging problem" bankswas a fair assessment of the their financial condition. Put another way, had the Central Bank closed all institutions that warranted closure at the time, then the Type II errors listed in Table 5 would have been considerably less.

In comparison to the existing use of the CAMEL model, the new model offers some advantages. Firstly, the model is less subjective in arriving at a bank's designated status. Given that each ratio is assigned benchmarks for each rating scale (1 - 5), it was easier to arrive at an aggregate composite rating for the whole bank. Secondly, the choice of the ratios used to assess capital, asset quality, earnings, and liquidity was relatively satisfactory given the findings of the matrix tests discussed earlier. There are no absolute tests for the choice and importance of specific variables that can be used in an early warning system and there have been limited attempts at developing a financial distress theory upon which such decisions can be based. Thus, on the basis that they are capable of distinguishing the different problem categories, the selected ratios can be accepted as satisfactory for the purpose intended.

The PEWS model is, however, affected by two basic limitations. Firstly, no mechanism had been put in place or suggested, for how often the benchmarks were to be revised. In an ever changing and sometimes volatile economy, like Zambia's, the possibility of using ratios which become inappropriate with the passage of a short period of time is high. Secondly, the absence of a structure for the analysis of non-financial issues renders it, like the CAMEL model, ineffective in diagnosing the underlying causes for the ratings that it ascribes to the different banks in the industry. Figure 8 shows that industry and macroeconomic factors have not been formally included in the analysis of bank performance, leading to the exclusion of environmental, competitor, and bank strategy analysis. It is these two primary limitations that the model discussed in the next section is intended to deal with.

4.0   THE CAMEL-S MODEL

4.1   Introduction

Both the existing CAMEL model and the PEWS offer a systematic framework for analysing bank performance and distinguishing between failing and non-failing banks, albeit with different levels of predictive ability. However, each suffers from two weaknesses related to their sole focus on ratios and the setting of performance benchmarks. Firstly, both the methods are solely ratio based analytical techniques that largely ignore non-financial indicators of failure, which may appear a lot sooner than a deterioration of ratios. Consequently, the use of either model means the Bank of Zambia will continue to deal with symptoms rather than with the diagnosis of the underlying causes of failure in the country.

Secondly, the total absence of benchmark ratios in the CAMEL model leaves the assessment of performance at the discretion of individual bank inspectors. Although the PEWS has benchmarks set to classify different levels of performance, it does not provide for a systematic review of those benchmarks. In a volatile developing economy, like Zambia's

benchmarks set today could be inappropriate the following month, due to a changed economic environment.

The CAMEL-S model proposed in this paper builds on the strengths of the two models, while at the same time dealing with these two key weaknesses. Rather than simply evaluating a bank's CAMEL rating, the paper proposes that the Bank of Zambia should be evaluating a bank's CAMEL-S rating. The known acronym of CAMEL should be extended to include a sixth area of bank analysis: S-Strategy analysis, which is based on non-financial strategic management models. The CAMEL-S model is designed to operate as a problem prediction model and adopts the similar bank rating classifications as the PEWS model. Bank performance is classified as either "Strong", "Satisfactory", "Possible Emerging Problem", or "Problem". The ratings have been extended on the upper scale in comparison to those of the PEWS, in order to distinguish between banks requiring little or no allocation of supervisory resources, and banks with deteriorating financial situations for which, progressively, more supervisory resources and actions may be required.

The CAMEL-S model is deliberately designed to incorporate non-financial indicators of bank performance (Figure 8). Bank specific, industry and environmental indicators of bank performance are analysed using numerical and non-numerical tools of analysis. Bank specific indicators are centred on a bank's capital, asset quality, earnings and liquidity ratios. Bank competitive, portfolio and directional strategies are also taken into account, while industry wide developments are analysed in respect of the threat of potential entrants, substitute services, suppliers and users of bank funding and the degree of industry rivalry. This study focuses solely on political and economic environmental factors. However, this does not preclude the inclusion of other social issues that increasingly play an important role in business.

Figure 8 The CAMEL-S model

In order to incorporate this new dimension of non-financial indicators, tools of analysis from the strategic management literature have been incorporated into the model. Porter's five forces, the generic strategies model, the BCG matrix, and the product-market matrix are used to discuss critical bank and industry specific non-financial issues affecting bank performance.

With respect to the financial analysis, the CAMEL-S model builds directly on the PEWS model, with modifications being made to the choice of ratio, and the computation of benchmark ratios. The choice of ratios in the PEWS has been retained with one exception. The ratio for the allowance for loan losses to total loans has been replaced with the ratio for non-performing loans to total loans. This has been done because it was observed that the former ratio could not equitably be subjected to a rating scale. An allowance of 2% to total loans may be more than adequate for a bank with an excellent loan portfolio, while the same ratio may not be adequate for another bank with a poor quality loan portfolio. Yet, on a rating scale, both would receive the same grade. On the other hand, it is generally accepted that the lower the ratio of non performing loans to total loans, the better the condition of the bank, regardless of its loan. The model is designed to revise, automatically, the benchmark ratios for the different classifications in the early warning system on the basis of industry performance. Instead of having numerically stated minimum and maximum limits for each ratio, indicating the different status classes, the model makes reference to numerical units above or below the industry median ratio in designating the different classes.

The median, rather than the mean, has been selected because when tests using the mean were used, the model benchmarks were adversely affected by outlier ratios, ratios that were so different from the performance of the other banks in the industry that the average was affected. This, of course, was not the case when the median was used. This concept is illustrated using the total capital ratio in Figure 9 and Table 6. Given the current trend in the total risk based capital ratios for the banks in Zambia, the ratings would rise significantly above the internationally set benchmark of 10%. This would be a welcome trend, as it would reflect what is desirable for a developing country like Zambia. It is clear that the capital adequacy requirements were designed for regulators in industrial countries, whose economies are generally larger and less vulnerable to external shocks. They are not tough enough for a developing economy like Zambia's. On the basis of the banks analysed, a more realistic capital adequacy requirement for Zambia would be in the region of 30% for Tier 1 risk based capital and 35% for Total risk based capital.

Figure 9 Comparision of PEWS and CAMEL-s Benchamrks

Like the PEWS model, the consolidation process follows three steps in which the rule of simple averages, or equal weightings, is applied. Firstly, each of the fourteen ratios is given a rating on a scale of one to five, indicating the classifications shown in Table 7.

Table 7   Camel-S ratio ratings

Rating	Designation
1	Strong
2	Satisfactory
3	Fair
4	Marginal
5	Unsatisfactory

Secondly, all the ratio ratings within each performance category are aggregated to arrive at a single rating. Finally all the performance category ratings are aggregated to arrive at the bank's composite rating and its classification defined in accordance with that rating as indicated in Table 8. Except for the breakdown of the PEWS "satisfactory" category into two – "Strong" and "satisfactory" - the rating scale is the same as that used by the PEWS model.

Table 8   CAMEL-S composite ratings

Composite rating	Designation
1.0 – 1.4	Strong
1.5 – 2.4	Satisfactory
2.5 – 3.5	Possible emerging problem
3.5 +	Problem

4.2   Financial analysis

Tests using moving benchmarks centered on the median, reveal that comparable results to those obtained using the PEWS model can be obtained, as indicated in Appendix D. The summary provided by Table 9 shows that the problem classifications followed the same pattern as the PEWS model, except for the sixth and twelve months prior to failure. However, Table 10 shows that when the cut off criterion was raised to include all banks classified as "possible emerging problem", and "problem", the overall number of misclassifications

reduced considerably. The number of banks that were predicted as either having a possible emerging problem, requiring watching or having problems, yet did not fail, were less.

Table 9   CAMEL-S summary of misclassification results (A)

Months before Failure	Number of Type I Errors (%)	Number of Type II Errors (%)	Total Number of Errors (%)
3	0 (0)	2 (13)	2 (13)
6	1 (6)	2 (13)	3 (19)
9	2 (13)	1 (6)	3 (19)
12	3 (19)	3 (19)	6 (38)
15	3 (19)	3 (19)	6 (38)
18	2 (13)	1 (6)	3 (19)
21	4 (25)	4 (25)	8 (50)
24	3 (19)	2 (13)	5 (31)

Table 10   Camel-S summary of misclassification results (B)

Months before Failure	Number of Type I Errors (%)	Number of Type II Errors (%)	Total Number of Errors (%)
3	0	5 (31)	5 (31)
6	0	3 (19)	3 (19)
9	0	4 (25)	4 (25)
12	0	5 (31)	5 (31)
15	0	5 (31)	5 (31)
18	0	4 (25)	4 (25)
21	0	3 (19)	3 (19)
24	0	4 (25)	4 (25)

The reasons for this change in results was that the model took into account the industry wide performance in classifying the different ratios. Therefore, while a composite rating of 2.5 with the PEWS model in June 1997 would warrant a "Possible Emerging Problem" classification, it would be graded "satisfactory" by the CAMEL-S model. The model automatically took into account the fact that all the banks in the industry had not performed as well as they had previously, hence the adjustment of all the individual grading downwards to accommodate this change. The consensus was that the most important contribution of the model was that it eliminated the need for periodic reviews of the benchmarks. The model provides a mechanism to do this without the credence of the individual bank classifications obtained using the PEWS model being lost.

Further analysis into the industry, bank strategy and political-economic environment reveals that the Bank of Zambia should have been able to diagnose and predict the failures a lot sooner. Sufficient non-financial indicators preceded the financial deterioration of ratios in the banks that failed.

4.3   Industry Analysis

A strategic review of the years 1996 and 1997, though perhaps cursory in approach, reveals that the banks that failed in the latter half of 1997 lacked the strategy requisite for the

environment within which they were operating. The failed banks' portfolio, competitive and growth strategies were inappropriate for the competitive and economic environment prevalent during that year. Rather ironically, the same environment, especially its political facet, may have delayed their eventual demise through the exercise of regulatory forbearance.

Following the liberalisation of the banking sector, there was significant rivalry between the local banks as they jettisoned for market share. The decontrol of foreign exchange, the liberalisation of interest rate controls and the introduction of the tender system in the sale of treasury bills on the open market, had a profound effect on the profitability and competitiveness of the banking sector. The degree of competition increased further with the bank closures of 1995. In the months that followed, there was a significant shift of deposits from the smaller local banks to the larger banks that were perceived to be safer. The five largest banks increased their share of deposits in the market from 64% in December 1994 to 80% in December 1995, a level that they maintained throughout 1996 and 1997. The fourteen remaining banks, largely local banks, had to compete for the remaining one fifth of the deposit market. Table 11 shows the Kwacha (K) deposit trends in recent years.

Table 11   Deposit trends

	Dec. 1994	Dec. 1995	Dec. 1996	Sept. 1997
Five largest Banks	K186 Bn (65%)	K338 Bn (80%)	K463 Bn (80%)	K561 Bn (77%)
Rest of the Banks	K102 Bn (35%)	K85 Bn (20%)	K118 Bn (20%)	K169 Bn (33%)
TOTAL DEPOSITS	K288 Bn (100%)	K423 Bn (100%)	K581 Bn (100%)	K732 Bn (100%)
Total No. of banks	18	17	19	19

The lack of service differentiation between the local banks also made them vulnerable to a price based competitive environment. The rational economic response to such competitive pressure was for smaller banks to merge in order to present a more credible rivalry with the larger more established banks in the industry. Speaking at the merger of First Merchant Bank (FMB), and Safe Deposit Bank, on 10th January 1997, FMB managing director acknowledged that "the Zambian banking sector had to accept that, in the prevailing financial quagmire, weaker banks had to merge with stronger ones in order to survive". Unfortunately, many of the failed banks resisted this option right up until their closure. The Credit Africa Bank chairman and proprietor dismissed talks of a merger with Prudence Bank on 23 April 1998, eight months before both banks collapsed, saying there was no benefit in bringing together two troubled banks. In the absence of clear viable strategic alternatives, failure was inevitable.

The threat of new entrants and suitable products was also a notable indicator of potential banking distress. During that same period the banking sector was faced with a rising number of non-bank financial institutions. These credit organisations were more willing and able to provide enterprise finance at lower interest rates than the banks. The extent to which these organisations attracted prudent local entrepreneurs away from bank finance has not been assessed in this study. Yet, given the government's decision to create an apex credit organisation, called the Zambia Enterprise Financing Company Limited, with capital of

US$30 million from the World Bank in October 1997, it is deduced that this substitute form of financing was a notable growing phenomenon. It was a phenomenon that may have worked to the disadvantage of the smaller local banks that had a relatively small clientele to fall back on.

Due to the shortage of a profitable variety of financial instruments, the local banks, especially those that failed, invested heavily in treasury bills during the same period 1995-1997, giving the government immense bargaining power to determine the level of industry profitability. The government could reduce the cost of its borrowing by reducing the Treasury bill rates without undue fear of losing its largest source of domestic funding. The reduction in Treasury bill rates squeezed the profits out of an industry heavily invested in treasury bills.

An examination of the industry wide forces prevalent in the Zambian banking industry, in the light of the strategies of the individual banks, revealed that it really was simply a matter of time before some of the banks collapsed.

4.4 Bank Strategy Analysis

With only a few exceptions, the banks in the industry pursed a cost leadership generic strategy, and a price based competitive environment prevailed. Unable to muster the resources required to sustain operations at the least possible prices, the smaller banks found that the advantages of such a path were short lived, as rivals easily imitated each other. The failed banks would have been well advised at the time to reconsider their competitive positions in favour of either differentiation or focus strategies, leaving the larger banks to pursue the least cost option. Only a bank of the size of the Zambia National Commercial Bank (ZANACO) could have sustained a loss of K9 billion for the financial year ended March 31, 1996 and continued to operate. The bank's Managing Director attributed the loss to the bank's cost restructuring exercise on 15 January 1997. This exercise was clearly intended to entrench its low cost leadership position.

During the two years prior to closure, the failed banks were burdened with an increasingly unbalanced and unprofitable portfolio of services. Government securities, which had been a very profitable investment in the past, ceased to be as profitable as they were in the early 1990's. Some of the banks tried to realign their portfolios by increasingly engaging in foreign exchange transactions. Unfortunately, the volatility of exchange rates meant that this was not always a favourable option. The local banks' heavy reliance on capturing savings accounts from the public also worked to their disadvantage. These accounts were highly unprofitable to operate. At the opening of Investrust Merchant Bank, the bank's finance director acknowledged this fact. Explaining why his bank would only concentrate on corporate and merchant banking he said, "the volume of transactions on savings accounts was high, yet the returns were low".

There was little outward growth during the years 1996 and 1997. Most of the local banks were struggling to maintain their existing market shares. With the same profile of products and services, they continued to penetrate the market.

The few publicly reported exceptions were ZANACO, Stanbic and Prudence Banks. On July 9, 1997 ZANACO announced its intention to open a branch in the Democratic Republic of Congo, soon after the government of Mobuto Se Se Seko was toppled. The fact that a government minister announced the planned market expansion underscores the point that the

decision was politically rather than economically inspired. In any case, the civil war that broke out soon after rendered such plans void. Stanbic announced plans to open branches on the Copperbelt on February 2, 1997 expecting to benefit from the anticipated boom in the regional economy once Zambian Consolidated Copper Mines (ZCCM) was privatised, an exercise that has yet to materialise. Except for the above growth actions taken, the rest of the banks appeared to be content with penetrating an otherwise saturated market. In an economy that was not growing, this strategy was a recipe for disaster. The ideal strategy would have been for them to seek new markets or new products that would not have placed them in direct competition with the larger banks.

4.5   Environmental Analysis

As Figure 11 shows, the type, form and or nature of the political relationship will vary both in form and origin - a relationship, which may prove critical to the determination of a bank's future. The potential impact of any given type of political relationship on an individual bank can only be determined by bank specific evaluation. A wholesale approach to the matter is not realistically feasible. Yet it is important that a bank analyst is aware of these factors and consciously takes them into account in the diagnosis and prediction of a bank's future.

At different times, each of the listed factors in Figure 10 has been the subject of public debate as possible reasons for the decision to close, or not to close, one of the failed banks in Zambia. The argument, like Honohan's (1997), is that, all too often, the problem has not been that the Bank of Zambia did not know or suspect that bank owners were ineffective, but that the owners were too well placed politically for their actions to be curtailed by regulators. In Zambia, there has been speculation that an early response to emergent banking problems has been inhibited by the political protection against closure which unsound banks appear to have enjoyed, with the resulting delays thus deepening the ensuing crisis. Dr Jacob Mwanza, BOZ Governor, as one of the discussants at the Central Bank Governors' symposium on 9th June 1997, remarked that, "In small and underdeveloped countries, influential figures tend to interfere with the normal running of banks to the extent that instability results.

Figure 10   Forms of Political influence

There was a lot of speculation at the time of the bank closures that the absence of an early response to the emerging banking failures by the Bank of Zambia was a direct result of the political protection that the banks seemed to enjoy. The Economic Association of Zambia stated that the Bank of Zambia needed to make independent decisions according to the dictates of the Banking and Financial Services Act, suggesting that the Central Bank was not adequately independent of the Government in making its supervisory decisions. The Bankers' Association Chairman and Barclays Bank Managing Director echoed this charge, at the time. He recommended the de-linkage of the Bank of Zambia from government, saying it would improve the operations of the central bank. More independence, he argued, would be a good thing.

The extent to which the political indicators can be used to identify a possible causation or inhibition of failure is difficult to establish. During the period of study there were numerous reports of the involvement of political leaders in the affairs of commercial banks as shareholders, board members or defaulting borrowers. In November 27, 1997 the Defence Minister, was reported as having bought 20% of Credit Africa Bank through his Investment Holdings Company. Earlier the same year, on July 17, Union Bank was reported to have

sued the Science and Technology Minister to recover K600 million owed to the bank. Further, on October 21, 1997 a number of Ministers, and senior party officials were listed as defaulting debtors partly responsible for the downfall of the embattled Prudence bank. The degree of financial impact, if any, that the above cases may have had on the banks involved, is subject to different interpretations. It was not possible to arrive at generalised guidelines that could be used for the diagnosis and prediction of bank failures. Suffice to state, however, that each event should not go unnoticed and must be treated on a case by case basis.

The quintessential environmental indicator of eminent bank failure was the economic performance of the country as a whole. The most important indicator of Zambia's economic performance during that period was the financial performance of Zambia Consolidated Copper Mines (ZCCM). The company accounts for almost 90% of Zambia's exports and foreign exchange earnings, and supports a significant proportion of the companies in the local economy. The combination of reducing copper output, falling metal prices, extremely tight credit policy, worsening liquidity, the non profitability of ZCCM, and the mounting debt service obligations of Zambia had a telling effect on the economy. To imagine that the banks would remain immune to these developments would have been the epitome of naivety. The rise in inflation, from 40% in 1992 to 192% in June 1993, led to a sharp rise in interest rates on loans and government securities. Because banks did not pass on all of this increase in interest rates to their depositors, there was an increase in the interest rate spread seen in Figure 12. Between 1992 and 1994, nominal banking profits were significantly higher than in previous years. Given that the capital required to establish a bank was only K20 million (USD 30,000) at the time, the BOZ received an increased number of bank licence applications (Brownbridge 1996, Muke 1998). New entrants were attracted and by December 1994, there were nineteen registered banks operating with 188 branches.
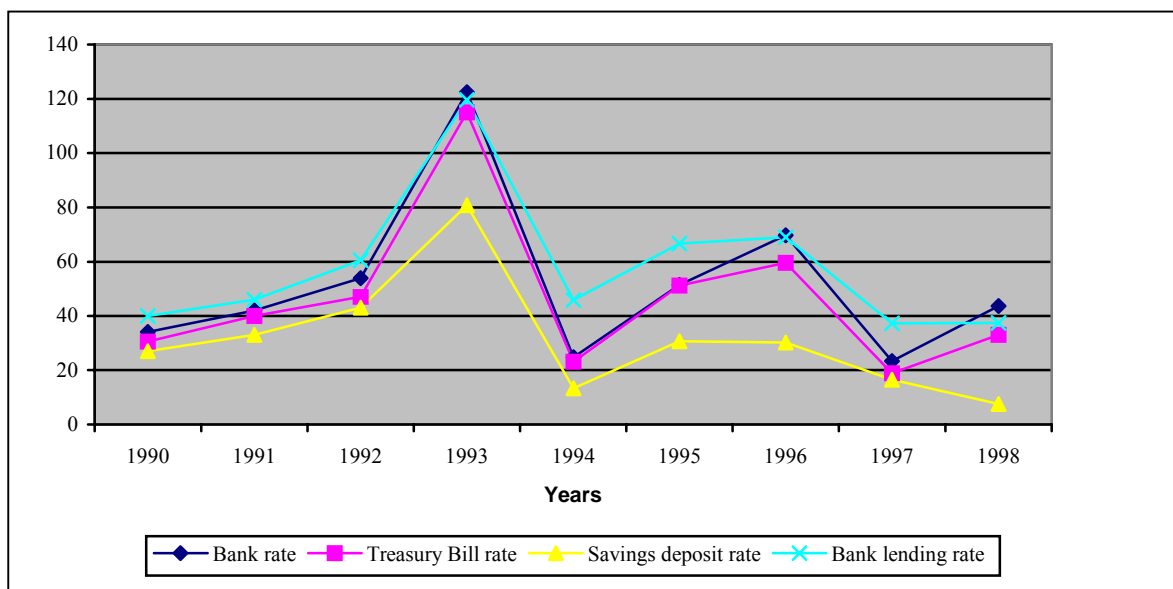
Figure 11   **Structure of interest rates, 1990-1998 (In percent at end of period)**
 Notes: Treasury bill rate annualised (weighted by maturity), Treasury bill rates became market determined in 1993, Commercial bank rates liberalised in 1992.
Source: Bank of Zambia,

As inflation exchange rates and interest rates began to stabilise, it became more difficult to maintain the same levels of profitability (Figure 11). Instead of curtailing activities in line

with the declining profit margins, some banks took on greater risks to match previous results (Mwape: 1997, 3). In the third quarter of 1993, and throughout 1994, adverse developments were taking place. Reckless lending left banks with unrecoverable loans and, in the quest to attract and retain customers, banks were disregarding prudent loan procedures and security arrangements. This was compounded by a rise in the cost of funds, shortages in liquidity, the erosion of earnings from treasury bills and foreign exchange operations, and shortages of capital (Muke: 1996). These developments culminated in the closure of three banks in 1995. Meridien BIAO Bank, then the fourth largest bank in the country, collapsed on 19 May, African Commercial Bank on 17 November, and Commerce Bank within the same month. The crisis affected the remaining banks in different ways. There was a general loss of customer confidence in the banking system, which was to the advantage of the foreign banks and the disadvantage of the local banks. There was a general "flight to quality" as customers opened accounts with foreign banks, which were perceived to be more stable and better managed. The declining financial performance of the local banks was made worse by the managerial deficiencies exhibited over the following two years.

Despite the efforts of the Bank of Zambia to redress the situation, the last quarter of 1997 saw yet another crisis emerge. Prudence Bank collapsed on 17 October, followed by Credit Africa Bank on 2 December, Manifold Investment Bank on 5 December and First Merchant Bank on 2 February 1998. Between 1995 and 1998, a total number of nine commercial banks failed and several government owned financial institutions were allowed to collapse as previously guaranteed financial subsidies were withdrawn.

4.6   Conclusion

Overall, the CAMEL-S model is a more flexible approach to the effective diagnosis and prediction of bank failures in Zambia than any currently in use, or proposed recently. Firstly, the model is able to monitor macroeconomic factors, industry specific factors and bank specific conditions. The identification of bank problems and the degree of potential failure is effected at three levels, as graphically represented in Figure 14, allowing for the identification not only of the financial symptoms of failure, but also the underlying strategic causes of that failure. Secondly, the use of other sources of information, such as the bank's strategic plans, and reliable press articles, is formally acknowledged and integrated in the design and implementation of the CAMEL-S early warning system. Finally, and perhaps most importantly for the financial analysis, the early warning system provides for an automatic means of revising the benchmarks for performance.

This CAMEL-S approach graphically conceptualised in Figure 12 ought to present a more comprehensive and all encompassing view of the expected duration of survival of a bank. By monitoring the macroeconomic indicators and industry indicators via an environmental and strategic analysis respectively, the model is able to complement the findings of financial analysis focused on bank specific characteristics. While the bank specific indicators are analysed monthly, the environmental and industrial analysis should be done quarterly.
Figure 12 The Camel-s early warning system

The core attribute of the CAMEL-S approach is that nothing is static. All elements of the model are dynamic and should be treated as such. Recent developments in industry must be fed through the model assessment and the model periodically revised to take in more relevant non-financial indicators of failure, and to cease the monitoring of factors that become increasingly redundant.

5.0   CONCLUSION

Research into failure prediction models has been complicated by the absence of a conceptual theory upon which to build such models. Attempts, however, continue to be made at identifying financial ratios that best differentiate general patterns of behaviour prior to failure. In banking, ratios relating to capital, asset quality, earnings and liquidity have been used in varying forms, either individually or by mathematically amalgamating them into a composite score.

The FSSD has made significant strides in improving the data collection and provision of information. In 1997, the FSSD produced a financial analysis guide stipulating the benchmarks for the ratios used in the analysis of commercial banks. The number of ratios used in the model was also extended to reflect the additional information being collected, such as the level of insider loans and large loans made at the bank. The financial analysis guide is currently being revised in line with the market developments in the banking sector. The format and frequency of filing prudential returns, by commercial banks, with the BOZ has been significantly enhanced during the year 1998. Commercial Bank circular No. 1/98 of January 21, 1998 requires all banks to submit 12 financial statements monthly and an additional two statements biannually. The statements are designed to provide off-site inspectors with the requisite data for substantive financial analysis.

However, the FSSD must bear in mind that there is a lot more to developing an effective early warning system than is first apparent.   Careful thought is required in selecting the indicators of failure and the tools of analysis to be used in the system, as all these have important implications on the overall predictive ability of the model.

In designing an early warning system and, more specifically, selecting the variables to include in the model, it has to be acknowledged that the process is not an exact science. Thus, it is not and should not be assumed to be a one off event, but rather an evolving process whereby bank specific, industrial wide, and environmental indicators of failure are constantly reviewed. Banks cannot be subjected to any form of static regimented early warning system.

In this study, it was observed that, irrespective of the model used, there was a substantial time lag between the identification of a problem at a bank and its eventual closure. The substantial time lag between the first time a financial analysis indicates potential problems at a financial institution, and the time of eventual closure, suggests that Bank of Zambia officials have often exercised forbearance when faced with a choice of either extending financial support or closing a bank down. The extent of regulatory forbearance may be attributed to the fear of a contagious run on the financial system by the political and economic establishment in the country. There was a long delay in acting against Meridien Bank in 1995. It continued to receive liquidity support from the Bank of Zambia long after it was apparent that the bank was in serious difficulties (other banks had stopped lending to Meridien nine months before it closed). By the time the Bank of Zambia closed Meridien Bank, its owners had accumulated an overdraft with the Bank of Zambia of K3 billion. As for the recent crisis, as early as

January 1997, the current CAMEL method of analysis had revealed that failure was eminent. With the exception of one bank, all of the five banks that closed in 1997/8 were either insolvent or imminently insolvent for a long time before closure.

It is widely believed that the authority of the Bank of Zambia to deal with the crisis was constrained by the government. Bull (1995) suggested that the Ministry of Finance overruled the Bank Governor when the latter recommended the closure of Meridien Bank in February 1995, and, subsequently, proceeded to provide liquidity support for the bank. The Governor's position regarding the future of the bank is widely believed to have led to his dismissal soon afterwards. This led to the suspicion that the issue may not actually be the failure to develop an effective early warning system. Rather, that it may be the high degree of regulatory forbearance being exercised by the Bank of Zambia in dealing with commercial banks that show signs of failure, forbearance here being defined as allowing an insolvent financial institution to remain open.

Goodhart (1998) refers to a formal theory of "self-interested bank regulation". The theory states that if regulators face uncertainty about the healthiness of banks and care not only about general social welfare, but also about their reputation, then they will sometimes avoid prompt and stringent action. Instead, they favour delaying the closure of a bank until later than is socially optimal. Incentives to delay intervention and disclosure are strong where the regulators perceive a high political cost of prompt and rigorous enforcement of intervention and closure rules. Where the Bank of Zambia has engaged in "self interested regulation", it has found itself avoiding early action and, instead, opting to provide the required liquidity to sustain a bank's operation. Yet, failure to implement prompt corrective measures has resulted in a mutual dependence between the Bank of Zambia and the financially troubled banks. The troubled bank requires additional financing to avoid failure. It also becomes harder for the Bank of Zambia to reveal the problem, close the bank and realise the losses at the expense of the taxpayer.

If the BOZ was aware of the financial problems existing in the failed banks, then there is a need to examine the effectiveness of the corrective measures, if any, that the Bank of Zambia took. Did the BOZ have the necessary legal authority to force offending banks to address their financial problems? Were the banks able to ignore the BOZ because of their political connections? To what extent did the institutional environment, within which the Bank of Zambia was operating in prevent the early resolution of the emerging banking problems? How long after the BOZ discovered that failed banks were undercapitalised or insolvent did it intervene or close them? What were the reasons for the delay? Did it lack the legal authority to intervene and close the banks? Was there political interference to prevent the closure of the banks? Would prompt corrective action rules, similar to the ones used in the USA, have ensured that the BOZ would have intervened earlier? One hypothesis is that the BOZ had the capacity and resources to detect the financial mismanagement, breaches of the law and financial deterioration in the failed banks. However, due to regulatory forbearance, the BOZ failed to enforce the required corrective action. The exercise of regulatory forbearance does not necessarily impair the effectiveness or importance of an early warning system, nor does it imply that forbearance is necessarily wrong. Goodhart (1998) set out a number of arguments in favour of forbearance, chief of which is the fact that systemic effects on the entire financial system, resulting from the closure of banks, may be more costly than supporting troubled commercial banks for limited periods.

In many respects, this research work has generated, for the Bank of Zambia, more questions

than it has answered. More work remains to be done in the area of non-financial analysis, wherein lie a number of useful indicators of impending failure. This is the first comprehensive study into the development of a model for the prediction and diagnosis of bank failures in Zambia (It will definitely not be the last). As such, it is bound to be imperfect, and although the author places a considerable level of confidence the conclusion and recommendations made, it is naive to assume that this is truly the optimal approach. The author hopes that this research has provided a basis for future research in this field. Future research should attempt to maintain a balance between use of financial and non-financial indicators of bank failure. Other avenues also include keeping early warning systems up to date in respect of accounting standards and practices, and the development of models that more suitably accommodate the new risks of banking, such as the use of financial derivatives.

As studies in this area continue, researchers must acknowledged and remember that developing early warning systems for bank supervisors, at least in developing countries, is not a science but an art. It is an art whose skills, like acting, are learnt with practice, and in which perfection is attained in front of a live audience on stage. This audience -albeit a political one in this case - unfortunately takes for granted a successful performance, yet is uncharacteristically unforgiving and quick to assign blame for the slightest of errors.

APPENDIX 6.1   DEFINITIONS AND INTERPRETATIONS OF KEY PERFORMANCE RATIOS

Source: Financial System Supervision Department, Bank of Zambia (1997) Financial Analysis & Regulatory Policy

DEFINITION	INTERPRETATION
CAPITAL	
Shareholders equity to total assets (equity capital + Share premium + Statutory reserves + retained earnings + revaluation reserves + general reserves + profit & Loss)/ (Total assets)	This is a crude measure of the extent to which a bank's total assets are financed by the shareholders equity
D**ebt to shareholders equity** (all debt in excess of one year)/(Equity capital + share premium + statutory reserves + retained earnings + revaluation reserves + general reserves + profit & loss)	Measures the basic net worth of an institution. Also referred to as the leverage ratio.
Net non performing loans to shareholders equity (net non performing loans / Shareholders equity)	Measures the severity of non-performing loans in relation to shareholders equity. It provides a useful insight to the extent to which shareholders equity is being eroded.
Tier 1 capital to risk weighted assets **Total capital to total weighted assets**	These ratios express the primary and regulatory capital as a percentage of the total risk weighted assets. They indicate the margin of protection available to both depositors and creditors against unanticipated losses that may be experienced by the bank. Thus, they reflect the banks resilience to economic difficulties.
ASSET QUALITY	
Earning assets total assets (balances with banks abroad + net loans + treasury bills and government securities + bills of exchange)/ (total assets)	Provides an indication as to the quality of assets of the bank. It highlights the proportion of the banks' asset that can be relied upon to generate income for the bank. A high level of earning assets indicates good quality.
Non performing loans to total assets	Indicates the percentage of total loans that have deteriorated and have been adversely classified as a percentage of the banks total assets portfolio. Where loans are a significant portion of total earning assets an increase in this percentage can seriously hinder the earning capacity of the bank
Non performing loans to total loans	Loans and advances usually represent the single largest asset of most banks. Thus monitoring the quality of the banks loan portfolio is of the utmost importance. The greater the ratio the higher the credit risk the bank is exposed to.

Allowance for loan losses to total loans	Provides useful insight into the quality of a banks loan portfolio and bad debts coverage, and the adequacy of loan loss provisions. However, this ratio may not be as useful as it ought to be due to reluctance on the part of the banks to write off unrecoverable loans, which inflates the ratio.
Allowance for loan losses to total no performing loans	A test of the adequacy of the allowance for loan losses. It reflects the extent to which the bank recognises how badly its total loan portfolio has been impaired.
EARNINGS	
Return on assets (Income before tax/ average assets for the month)	Measures the net income generated from the employment of the total assets of the bank. If reasonable accounting principles are consistently applied to banks with similar asset structures, a bank with a higher return on assets is inherently sounder than one with a lower ratio.
Return on equity (income tax/shareholders equity)	Measures the rate of return on the shareholders equity investment. In an inflationary environment likely Zambia the rate should ideally be at least that of the ruling inflation rate so as to enable the bank to maintain its equity base in real terms, assuming no dividends are paid out
Net interest margin (total interest income –interest expense/total interest income)	Identifies and evaluates the core earning capacity of the bank. A negative or declining ratio is an important indicator of treasury management problems that require attention.
Interest rate spread (Average interest rate on loans – average interest rate on deposits)	This indicates the interest rate gap between the loans and deposits of a bank. Together they represent the primary interest earning asset and interest expense item respectively for most banks. The greater the gap the more profitable a bank will be, with the reverse also being true.
Loans yield rate (Interest income from loans)/(Gross loans – non performing loans)	This is the effective return on the bank's investment in loans
Government securities yield rate (Interest income from government securities)/(Government securities)	This is the effective return on the bank's investment in government securities.

LIQUIDITY **Liquid assets ratio** (Short term assets: Cash due from banks, balances with banks abroad, Treasury Bills and Government securities, Interest receivable, bills of Exchange, balances with Bank of Zambia)/(Short term liabilities: total deposits, liabilities to bank of Zambia , liabilities to other banks, Interest payable, Bills Payable and other liabilities)	A rather crude yet useful measure of a bank's liquidity. It reflects the bank's ability to meet its short-term liabilities with its short-term assets. A bank that does not have to rely on the repayment of its loans in order to meet its obligations is "insulated" against its non-performing portfolio.
Total deposits to total assets (Core deposits: Demand, savings, and Time/ Total assets)	Measures the extent to which the bank assets are financed by the deposits of its customers. The greater the ratio the greater its vulnerability to liquidity problems in the event of a run on the bank.
Gross Loans to total deposits (loans before deducting allowance for loan loss/ total deposits)	Measures the extent to which a bank is able to mobilise deposits from the public to support its operations and the extent to which it is able to lend these deposits. A higher ratio is traditionally associated with a greater element of risk since this indicates lower liquidity vulnerability to institutional lenders, adverse economic conditions, and/ or, the consequences of a deposit run. A ratio of 50% and above is considered adequate.

APPENDIX 6.2 RATIO BENCHMARKS FOR THE PROPOSED EARLY WARNING MONITORING SYSTEM

Source: Financial System Supervision Department, Bank of Zambia (1997) Financial Analysis & Regulatory Policy Proposal Document

Capital Analysis

RATING *	DESCRIPTION
1	Core capital at least 8% of total risk weighted assets Total capital at least 10% of total risk weighted assets
2	Core capital at least 6% of total risk weighted assets Total capital at least 10% of total risk weighted assets
3	Core capital at least 4% of total risk weighted assets Total capital at least 10% of total risk weighted assets
4	Core capital at least 2% of total risk weighted assets Total capital at least 10% of total risk weighted assets
5	Core capital less than 2% of total risk weighted assets Total capital less than 4% of total risk weighted assets

Asset Quality Analysis

RATING	DESCRIPTION
1	Non-performing loans equal to or less than 5% of total assets Loan reserve more than 1.5% of total loans
2	Non-performing loans from 6% to 10% of total assets Loan reserve more from 1.0% to 1.5% of total loans
3	Non-performing loans from 11% to 15% of total assets Loan reserve more from 0.8% to 0.9% of total loans
4	Non-performing loans from 16% to 20% of total assets Loan reserve more from 1.0% to 1.5% of total loans
5	Non-performing loans greater than 20% of total assets Loan reserve less than 0.5% of total loans

*1(Strong), 2(Satisfactory), 3(Fair-needs improvement), 4(Marginal), 5(Unsatisfactory)

Income Analysis

RATING	DESCRIPTION
1	Net Interest margin (NIM) greater than 5% of Interest income Operational income greater than 0.8% of Total assets Net income greater than 1.0% of Total Assets
2	NIM from 4% to 5% of interest income Operational income from 0.6% to 0.8% of total assets Net income from 0.8% to 1.0% of total assets
3	NIM from 3.0% to 3.9% of interest income Operational income from 0.4% to 0.59% of total assets Net income from 0.5% to 0.79% of total assets
4	NIM from 2.0% to 2.9% of interest income Operational income from 0.2% to 0.39% of total assets Net income from 0.2% to 0.49% of total assets
5	NIM below 2% of interest income Operational income less than 0.2% of total assets Net income below 0.2% of total assets

Deposit Trend

RATING	DESCRIPTION
1	Deposits increase in all categories Loans to deposit ratio less than 70% Core deposits more than 50% of total deposits
2	Deposits increase in most categories Loans to deposit ratio from 76% to 80% Core deposits from 31% to 40% of total deposits
3	Only modest deposit increase in a few categories Loans to deposit ratio from 76% to 80% Core deposits from 31% to 40% of total deposits
4	Modest increase deposits Loans to deposit ratio from 81% to 85% Core deposits from 21% to 30% of total deposits
5	Deposits increase in most categories Loans to deposit ratio greater than 85% Core deposits equal to or less than 20% of total deposits

Liquid Assets Analysis

RATING	DESCRIPTION
1	Liquid Assets Excess more than 15% of Total Assets Loans to Asset Ratio less than 65% Liquid Assets to Deposits Ratio over 50%
2	Liquid Assets Excess over 5% of Total Assets Loans to Asset Ratio less than 70% Liquid Assets to Deposits Ratio from 20% to 50%
3	Liquid Assets Excess or deficiency less than or equal to 5% of Total Assets Loans to Asset Ratio less than 75% Liquid Assets to Deposits Ratio from 15% to 19%
4	Liquid Assets Excess over 5% of Total Assets Loans to Asset Ratio less than 80% Liquid Assets to Deposits Ratio over 50%
5	Liquid Assets Excess more than 15% of Total Assets Loans to Asset Ratio less than 65% Liquid Assets to Deposits Ratio from 10% to 14%
6	Liquid Assets Deficiency greater than 15% of Total Assets Loans to Asset Ratio of 80% and above Liquid Assets to Deposits Ratio below 10%

APPENDIX 6.3
APPENDIX 6.4
APPENDIX 6.5
APPENDIX 6.6

7.0   BIBLIOGRAPHY

Altman E., Avery R., Eisenbeis R., and Sinkey J. (1981) *Application of Classification Techniques in Business Banking and Finance*, Connecticut, Connecticut.

Altman, E (1968) "Financial ratios, discriminant Analysis and the prediction of corporate bankruptcy." *The Journal of Finance*, Vol. XXIII No.4

Ansoff, I H (1984). *Implanting Strategic Management*. Prentice Hall International, London.

Argenti, J (1976) *Corporate collapse: the causes and symptoms*, McGraw-Hill Book Company, London

Bank of Zambia, (1995), *Financial System Supervision Annual Report*, Lusaka, Bank of Zambia

Bank of Zambia, (1996) *Bank of Zambia Annual Report*, Lusaka, Bank of Zambia,

Bank of Zambia, (1997) *Fortnightly Statistics*, Bank of Zambia, Lusaka, No. 13 June, 27, 1997

Bank of Zambia, (1997) *Fortnightly Statistics*, Bank of Zambia, Lusaka, No. 21 October 17, 1997

Bank of Zambia, (1997) *Fortnightly Statistics*, Bank of Zambia, Lusaka, No. 29 May 29, 1997

Bank of Zambia, (1996) *Financial System Supervision Annual Report,* Bank of Zambia, Lusaka

Bank of Zambia (1997) Bank of Zambia Annual Report, Bank of Zambia, Lusaka

Bank of Zambia (1998) Bank of Zambia Annual Report, Bank of Zambia, Lusaka

Baruch, L (1974) *Financial Statement Analysis: A New Approach*, Prentice Hall, Englewood Cliffs, New Jersey

Beaver W H (1968) "Market Prices, Financial Ratios, and the Prediction of Failure", *Journal of Accounting Research* Vol.6 No.2 (autumn 1968)

Bolnick, B., (1997) Establishing Fiscal Discipline: the Cash Budget in Zambia. In M. S. GRINDLE, ed. Getting Good Government: Capacity building in the public sectors of developing countries. Harvard: Harvard University Press: pp.297-333.

Brownbridge, M. (1996) *Financial Policies and the Banking System in Zambia*, UNCTAD, Geneva
- (1998) "The Causes of Financial Distress in Local Banks in Africa and Implications for Prudential Policy", *UNCTAD Discussion paper*, Geneva
- and Kirkpatrick, (1998) "Financial Sector Regulation". A paper presented at the Eighth Seminar on international Finance, Asian Development Bank Institute, Tokyo, Japan, 25-27 November 1998.
- and Harvey, C., (1998) *Banking in Africa* The impact of Financial Sector Reform since independence. James Currey. Oxford.

Bull, T and Simpson, D (1995) "End of the Road for Meridien", *Profit*, No.4/1 June,

Chimuka C., (1997), "Bank Supervision and Deposit Insurance: The 1995 Banking Crisis" *B.BA Dissertation*, Copperbelt University, Kitwe

Demiruguc-kunt, A. and Detragiache, (1998) The determinants of banking crises in developing and developed countries", Staff papers, international monetary fund Vol.45 (March), pp.81-109.

Dobson P., Starkey K., (1993), *The Strategic Management Blueprint*, Oxford Press, Oxford

Federal Reserve Bank (1994) *Commercial Bank Examination Manual*, Section 1020.1, New York

Foster, G (1978) *Financial Statement Analysis*, 2nd Edition, Prentice-Hall International, New York

González-Hermosillo, B, Pazarbaşioğlu C, and Billings R, (1997) "Determinants of Banking System Fragility: A Case Study of Mexico" *IMF Staff Papers* Vol.44. No.3 (Sept. 1997).

González-Hermosillo, B., (1999) "Determinants of ex-ante banking system distress: a macro-micro empirical exploration of some recent episodes", IMF Working Paper WP/99/33

Goodhart C, Hartman P, Llewllyn D, Rojas-Suárez, L and Weisbrod, S (1998) *Financial Regulation Why How and where now?* Routledge, London.

Heffernan, S (1996) *Modern Banking in Theory and Practice*, John Wiley and Sons, Chichester.

Honohan P. (1997) "Banking System Failures in Developing Countries: Diagnosis and Prediction", Bank of International Settlements, BASLE.

Kaminsky, G., and Reinhart, C., (1996) "The Twin Crises: The Causes of Banking and Balance of Payment Problems", International Finance Discussion Paper No. 544 (Washington: Board of Governors the Federal Reserve System, March).

Kaminsky, G., Lizondo, S., and Reinhart, C., (1997) "Leading indicators of currency crises", IMF Working paper WP/97/79.

Kay J (1993) "*Foundations of Corporate Success: How business Strategies add value*", Oxford University Press, Oxford

Li-Ling Vicky Wang (1995) "Strategies for Financial Services Industry: A comparison between British and Japanese Banking", *MBA Dissertation*, University of Nottingham, Nottingham.

Maimbo, S.M., (1996), "Interpretation of financial statements using key performance ratios" *Financial System Supervision Department Discussion Paper*, Bank of Zambia, Lusaka
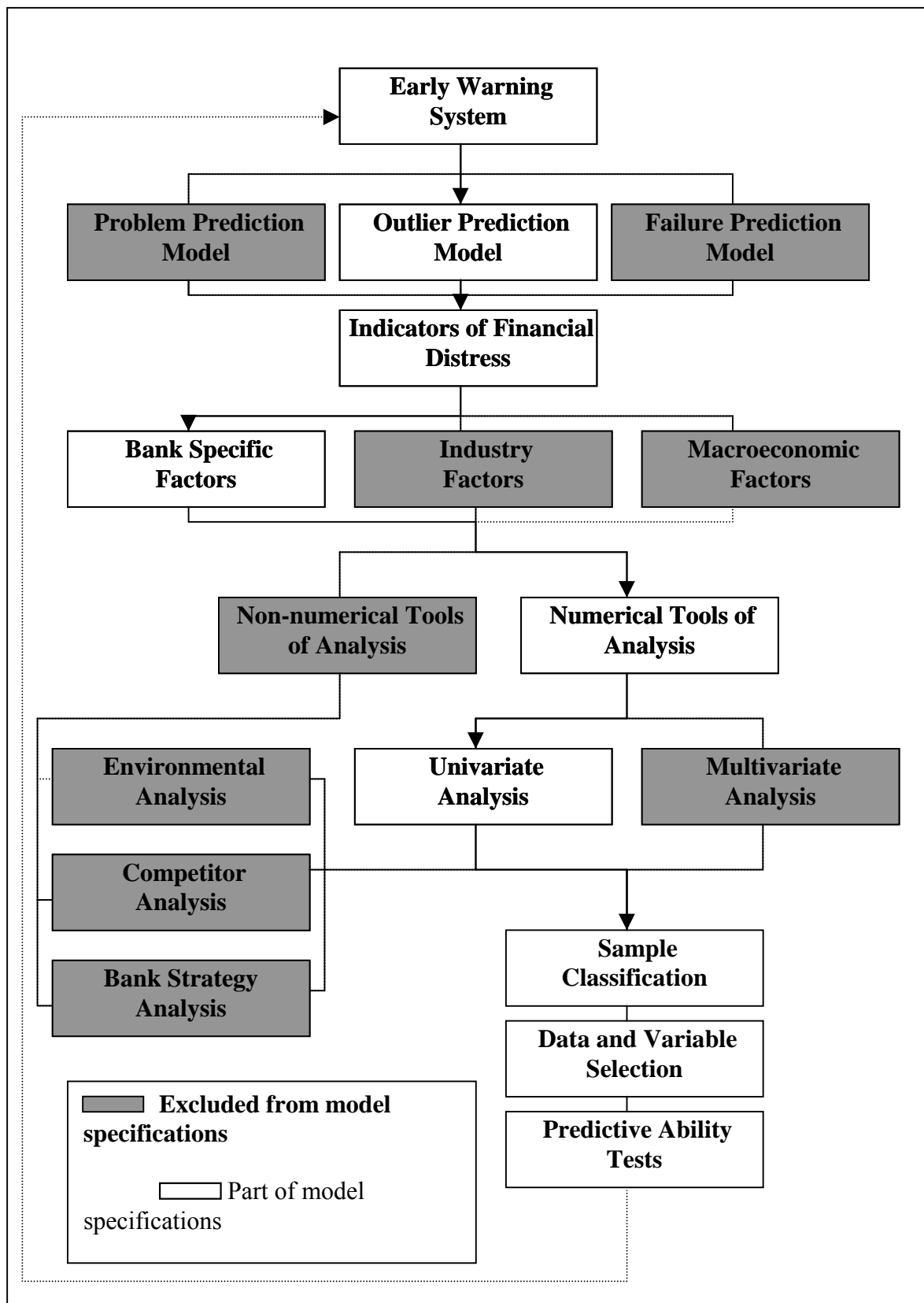
Maimbo, S.M., (1998), "The Diagnosis and Prediction of Bank Failures in Zambia". *MBA Dissertation*, Nottingham University

Maimbo, S.M., (1999), "Bank Failures in Tanzania, Uganda and Zambia", *mimeo*, IDPM, University of Manchester

Mintzberg H, (1998), *The Strategy Process: Concepts, Contexts, Cases*, Prentice hall International, Prentice Hall International, 3rd Edition, New Jersey

Montgomery (1998), "An Early Warning System for Bank Supervision", Bank of Zambia paper presented to the Bank of Zambia

Mudenda E., (1998), "Financial Sector Reforms: Effectiveness of prudential regulation and banking regulations in Zambia" *MBA Dissertation*, Birmingham

Muke J. (1996), "The State of Banks in Zambia", A paper presented at a Senior Auditors Seminar in Siavonga, Bank of Zambia, Lusaka

Muke J. (1998) "Investment Opportunities in the Banking Sector and the Effects of Bank Closures". A paper presented at the Zambia Investment Promotion Mission in South Africa, 8 - 23 February 1998, Bank of Zambia, Lusaka

Muke, J., (1998), "The Zambian Experience with reforming the banking system" A paper presented at the Graduate Institute of international studies, 26-28 October 1998, Geneva Switzerland.

Mulaisho D. (1998), " Financial Crisis", A paper presented at the Bank of Zambia International Conference August 5-7, 1998

Musokotwane, S., (1997), "Bank competitiveness, restructuring and privatisation in Zambia" A paper presented at the first commonwealth seminar on bank competitiveness, restructuring and privatisation held at the Whitesands Hotel, Mombassa, 1-4 July 1997.

Mwape A. (1997), "Effectiveness of bank of Zambia Supervision of Commercial Banks." A paper presented to the Economic Association of Zambia at Pamodzi Hotel, 11 February 1997, Bank of Zambia, Lusaka

Mwape A. (1997), "The Regulation of Banks in Zambia", A paper presented at the British Council Management Centre - 27 November 1997, Bank of Zambia, Lusaka

Mwenda A., (1996) "Foreign Exchange Liberalisation in Zambia" A paper presented at the BOZ International conference – Economic Liberalisation: experiences & the way forward., Lusaka, Zambia, 21023 August 1999, pp30-35

Mwinga, D, and Sichangwa C, (1998), Initial Thinking on Zambian Microfinance and an Appropriate Legal Environment for Growth. A paper presented at the Zambia "Microfinance Legal Framework: Stakeholder Discussions" Workshop, Pamodzi Hotel Lusaka, Zambia, 4 November 1998
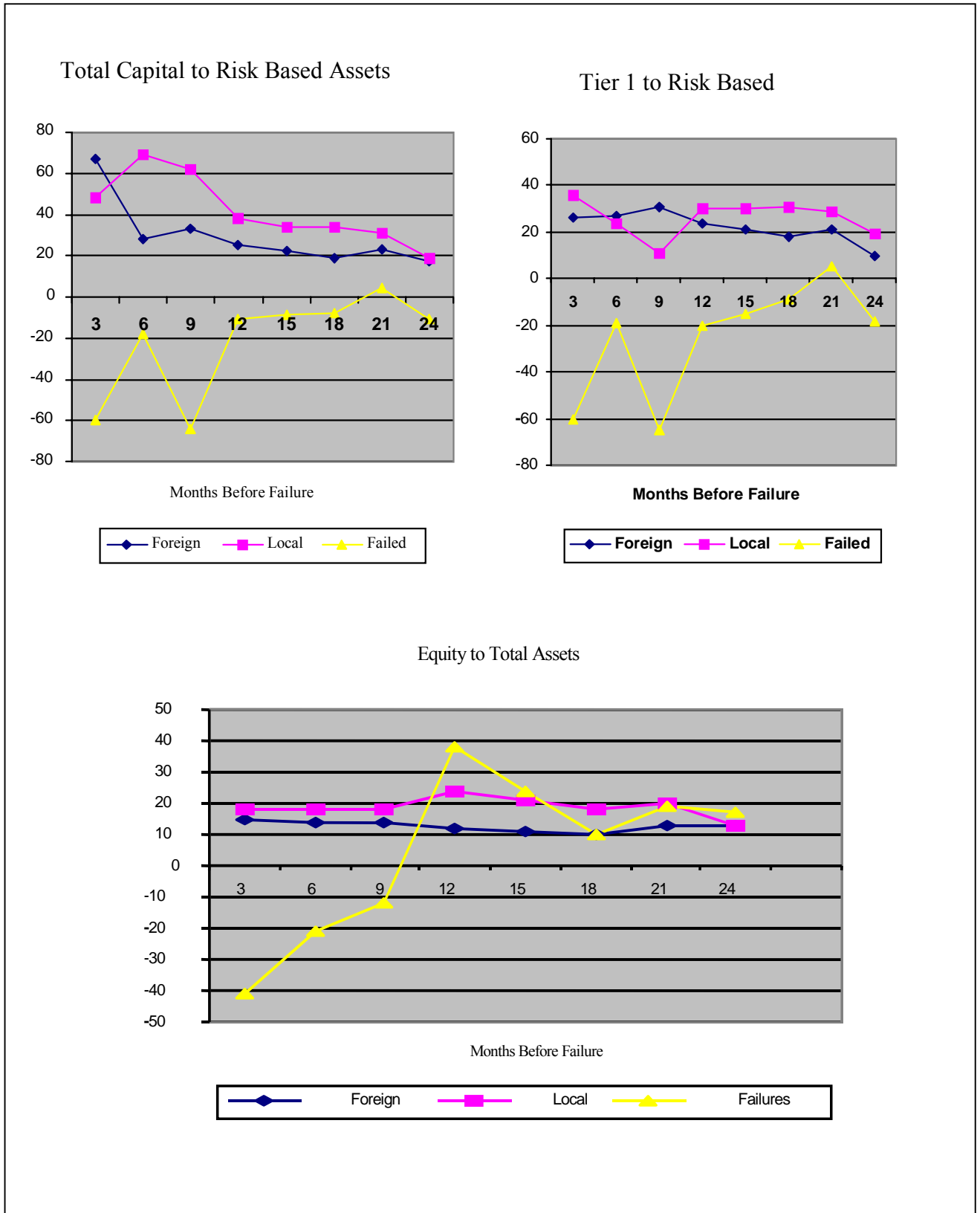
Mwinga, M., 1998, "(Effects), of liberalisation on insurance business and future prospects" A paper presented at the Pensions & Insurance Workshop, Lusaka, Zambia, 20 May 1998

Njobvu E., (1996), "Fiscal Policy in a liberalised economy" A paper presented at the BOZ International conference – Economic Liberalisation: experiences & the way forward. Lusaka, Zambia, 21023 August 1999, pp36-37

Pantalone C & Platt M B (1987), "Predicting Commercial Bank Failure Since Deregulation" *New England Economic Review*, Federal Reserve Bank of Boston, July/August 1987.

Porter (1981), *Competitive Strategy: Techniques for Analysing Industries and Competitors*. The Free Press, New York

Porter (1979), "How Competitive Forces Shape Strategy", *Harvard Business Review*, Mar.-Apr.)

Rojas-Surez, L., (1998) "Early warning indicators of banking crises: what works for developing countries?" unpublished manuscript, February.

Staff Reporter – Jere D (1997), "Manifold finally closed", *The Post*, No.867, December 5, 1997

Staff Reporter – Kaunda J (1997), "Citibank Launches Customer Relations Initiative", *The Post*, No.856, November 20, 1997

Staff Reporter – Kaunda J & Mwondela C., (1997), "BOZ Blamed for Bank Closures", *The Post*, No.868, December 8, 1997

Staff Reporter – Kaunda J (1997), "CAB in Merger", *The Post*, No.709, April 23, 1997

Staff Reporter – Kaunda J (1997), "United Bank of Zambia Opens", *The Post*, No.657, February 7, 1997

Staff Reporter – Lungu M (1997), "ZANACO records K90 Billion Loss", *The Post*, No.640, January 15, 1997

Staff Reporter – Mwondela C (1997), "Government Creates Credit Organisation", *The Post*, No.835 October 21, 1997

Staff Reporter – Phiri R (1997), "BY acquires 20% of CAB", *The Post*, No.861, November 27, 1997, 1997

Staff Reporter (1996), "Another Merchant bank To open Soon", *The Post*, No.558, September 17, 1996

Staff Reporter (1997), " Ministers Caused Prudence Bank Closure", *The Post*, No.835 October 21, 1997

Staff Reporter (1997), "BOZ Approves Chase Trust Take Over", *The Post*, No.863, December 2, 1997

Staff Reporter (1997), "BOZ Takes Over Prudence Bank", *The Post*, No.-, September 26, 1997

Staff Reporter (1997), "Finance Bank Receives K6.5 Billion From IFC", *The Post*, No.735, May 10, 1997

Staff Reporter (1997), "More Companies go into Receivership", *The Post*, No.668, February 24, 1997

Staff Reporter (1997), "Union Bank Sues Kavindele", *The Post*, No.768, July 17, 1997

Staff Reporter –Mwondela C (1997), "Weaker Banks Advised to Merge with Stronger Banks", *The Post*, No.637, January 10, 1997

Vossen J W (1996), "Assessment of the Management of Banks". A paper presented to the International Monetary Fund Monetary and exchange Affairs Department & World bank Financial Sector and development Department Workshop on banking Supervision Harare, Zimbabwe, May 20-31, 1996
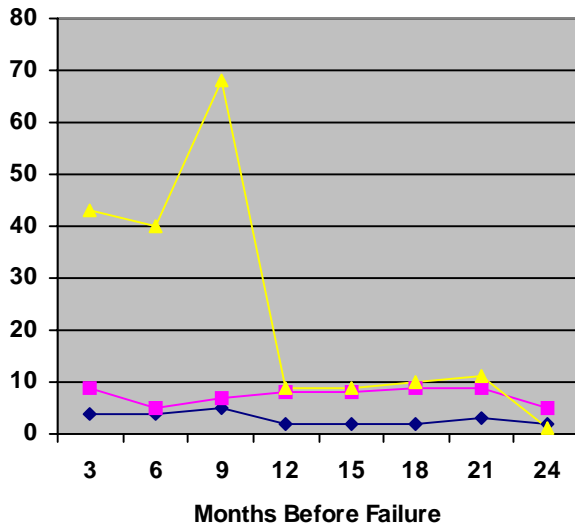
Figure 2   The BOZ Camel Model

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              ┌────────▶│  Early Warning  │
              ┆         │     System      │
              ┆         └─────────────────┘
              ┆                  │
    ┌─────────────────┐ ┌─────────────────┐ ┌─────────────────┐
    │ Problem Prediction│ │ Outlier Prediction│ │ Failure Prediction│
    │      Model       │ │      Model       │ │      Model       │
    └─────────────────┘ └─────────────────┘ └─────────────────┘
                                │
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                        │ Indicators of   │
                        │Financial Distress│
                        └─────────────────┘
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- Early Warning System
- Problem Prediction Model
- Outlier Prediction Model
- Failure Prediction Model
- Indicators of Financial Distress
- Bank Specific Factors
- Industry Factors
- Macroeconomic Factors
- Non-numerical Tools of Analysis
- Numerical Tools of Analysis
- Environmental Analysis
- Univariate Analysis
- Multivariate Analysis
- Competitor Analysis
- Bank Strategy Analysis
- Sample Classification
- Data and Variable Selection
- Predictive Ability Tests

▨ **Excluded from model specifications**

▢ Part of model specifications

Figure 3   BOZ CAMEL capital ratios

Total Capital to Risk Based Assets

Months Before Failure

Foreign   Local   Failed

Tier 1 to Risk Based

Months Before Failure

Foreign   **Local**   **Failed**
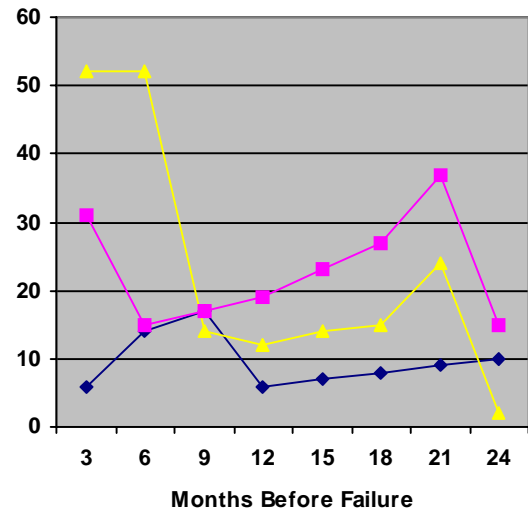
Equity to Total Assets

Months Before Failure

Foreign   Local   Failures

Figure 4   BOZ CAMEL asset quality ratios

Non Performing Loans to Total Assets

Non Performing Loans to Total Loans

Allowance on Loans to Total Loans
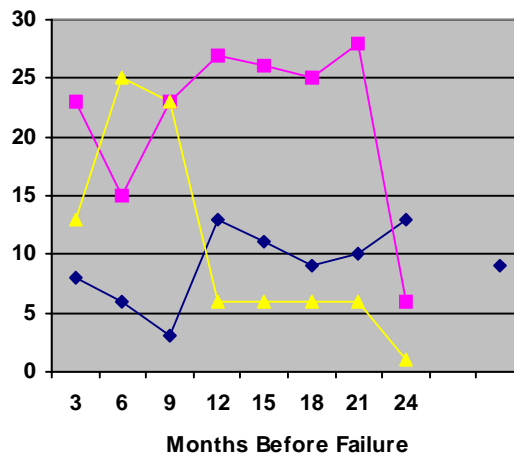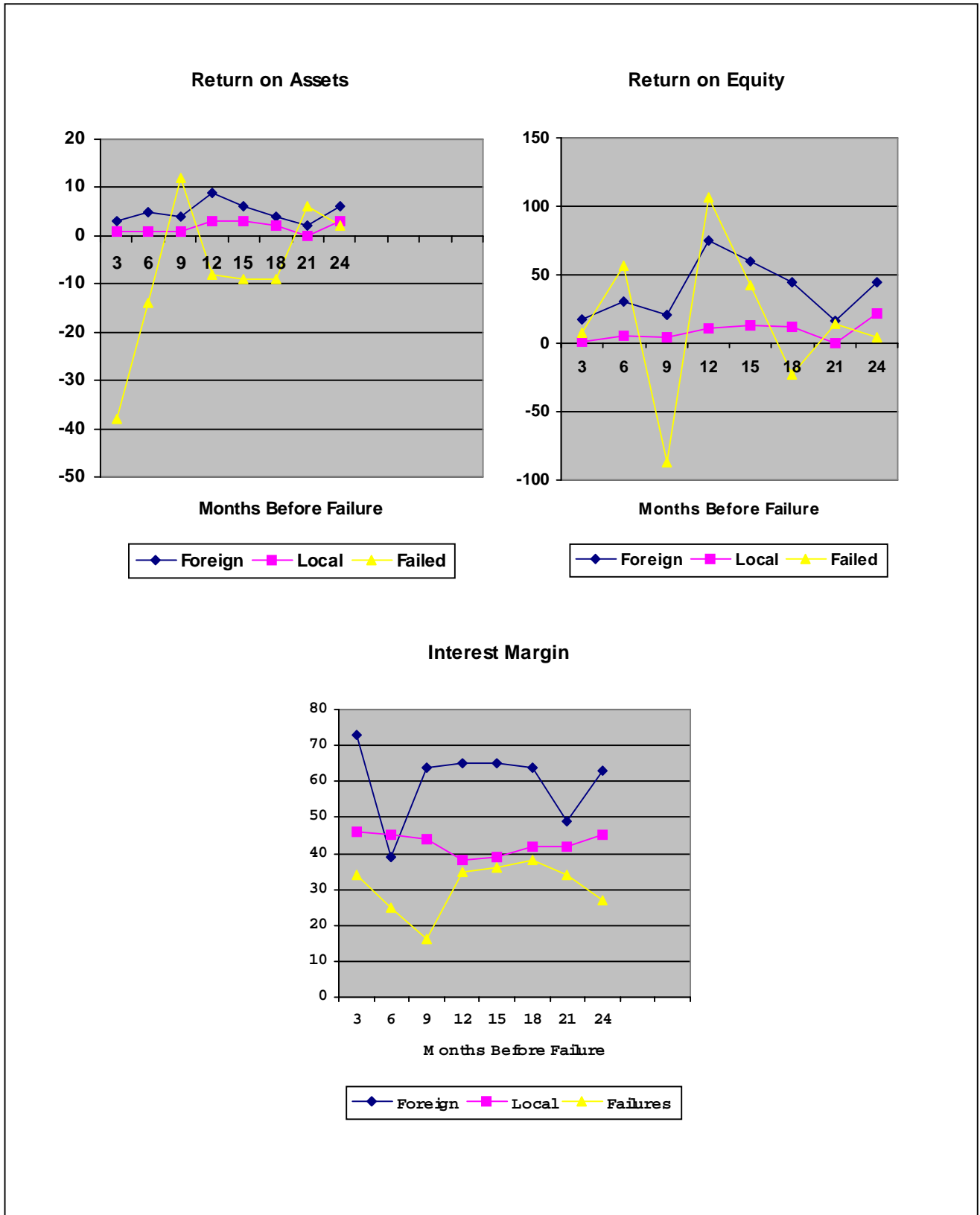
Figure 5   BOZ CAMEL earnings ratios

Return on Assets

Months Before Failure

Foreign   Local   Failed

Return on Equity

Months Before Failure

Foreign   Local   Failed

Interest Margin

M onths Before Failure

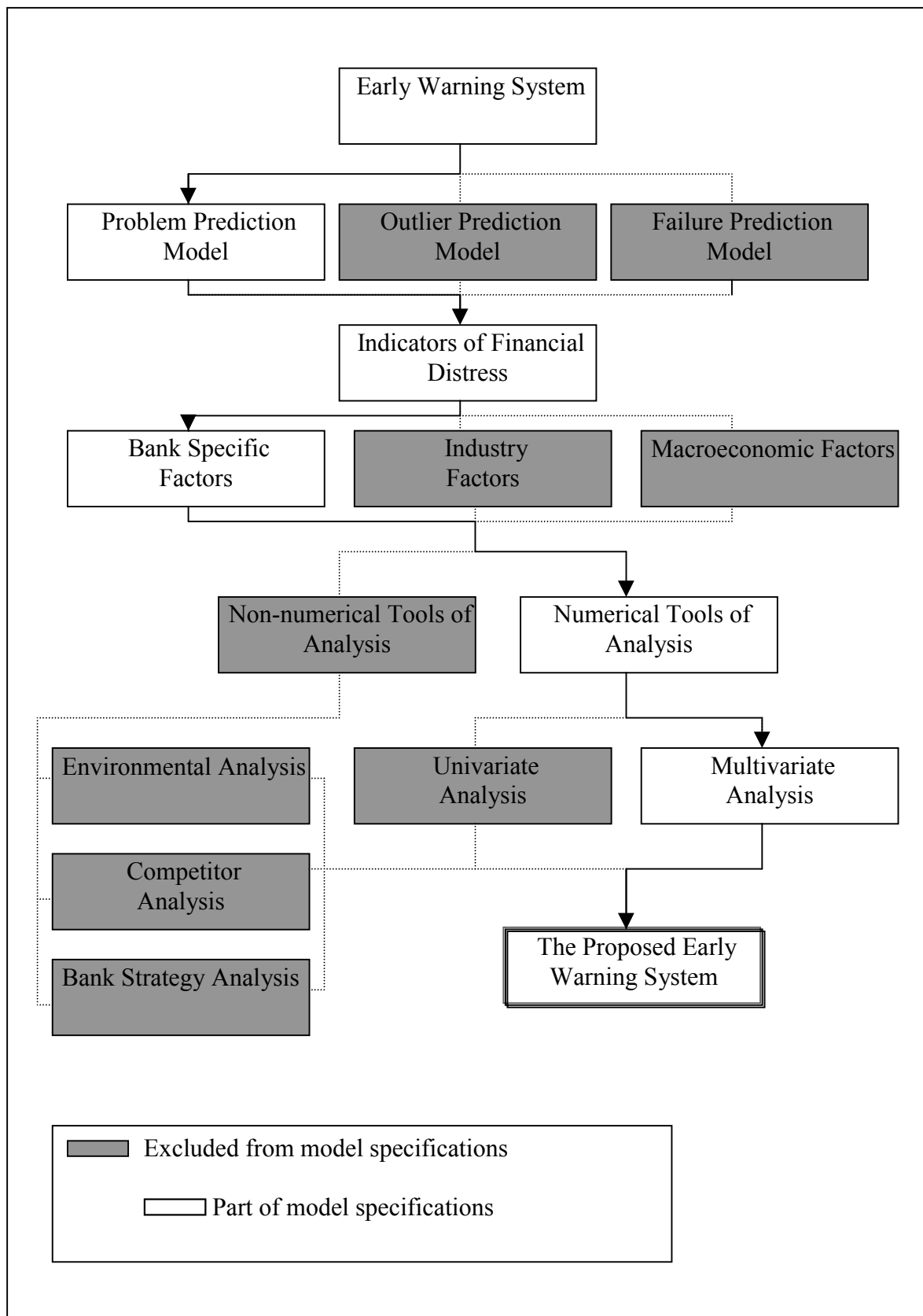Foreign   Local   Failures

Figure 6 BOZ CAMEL liquidity ratios

43
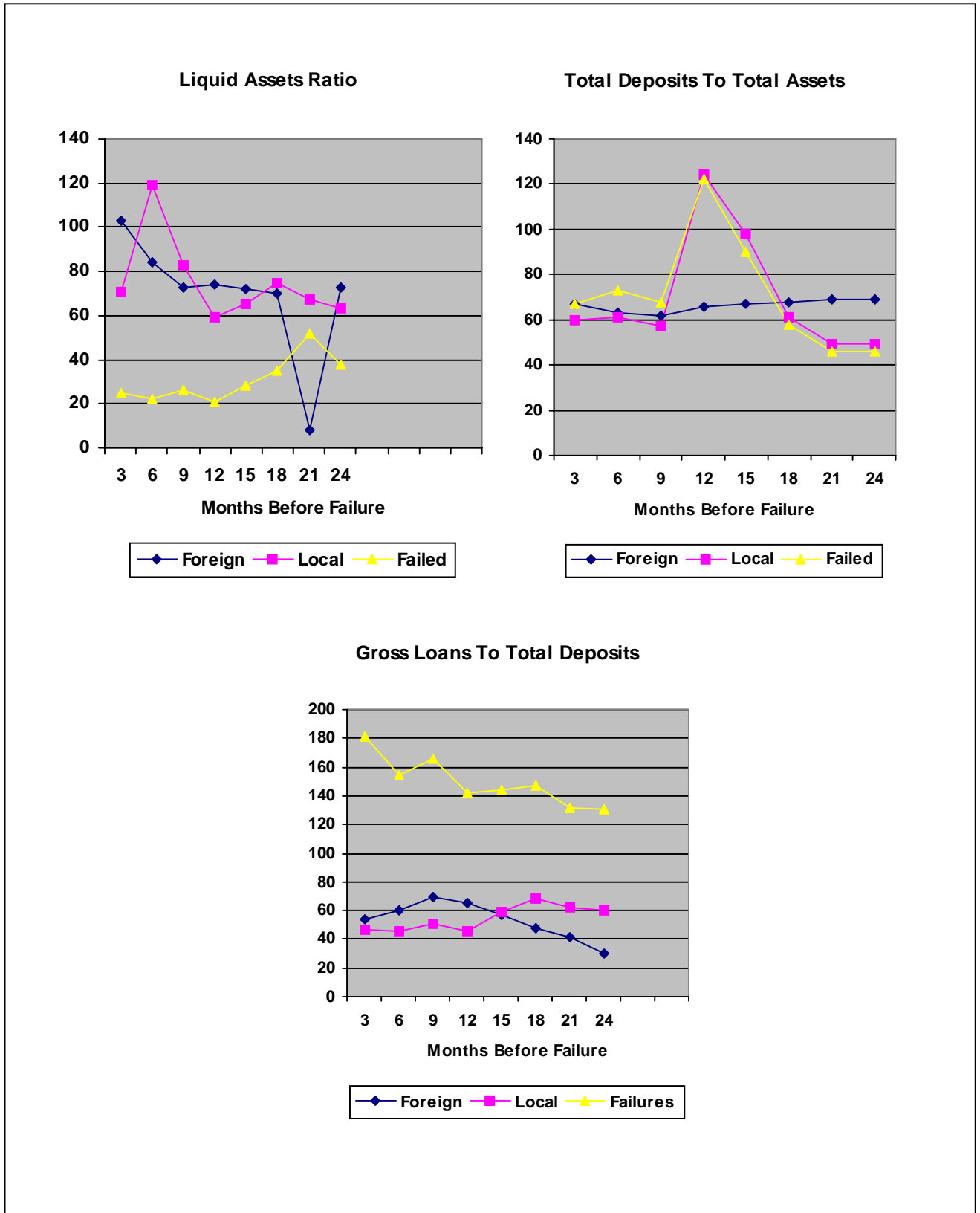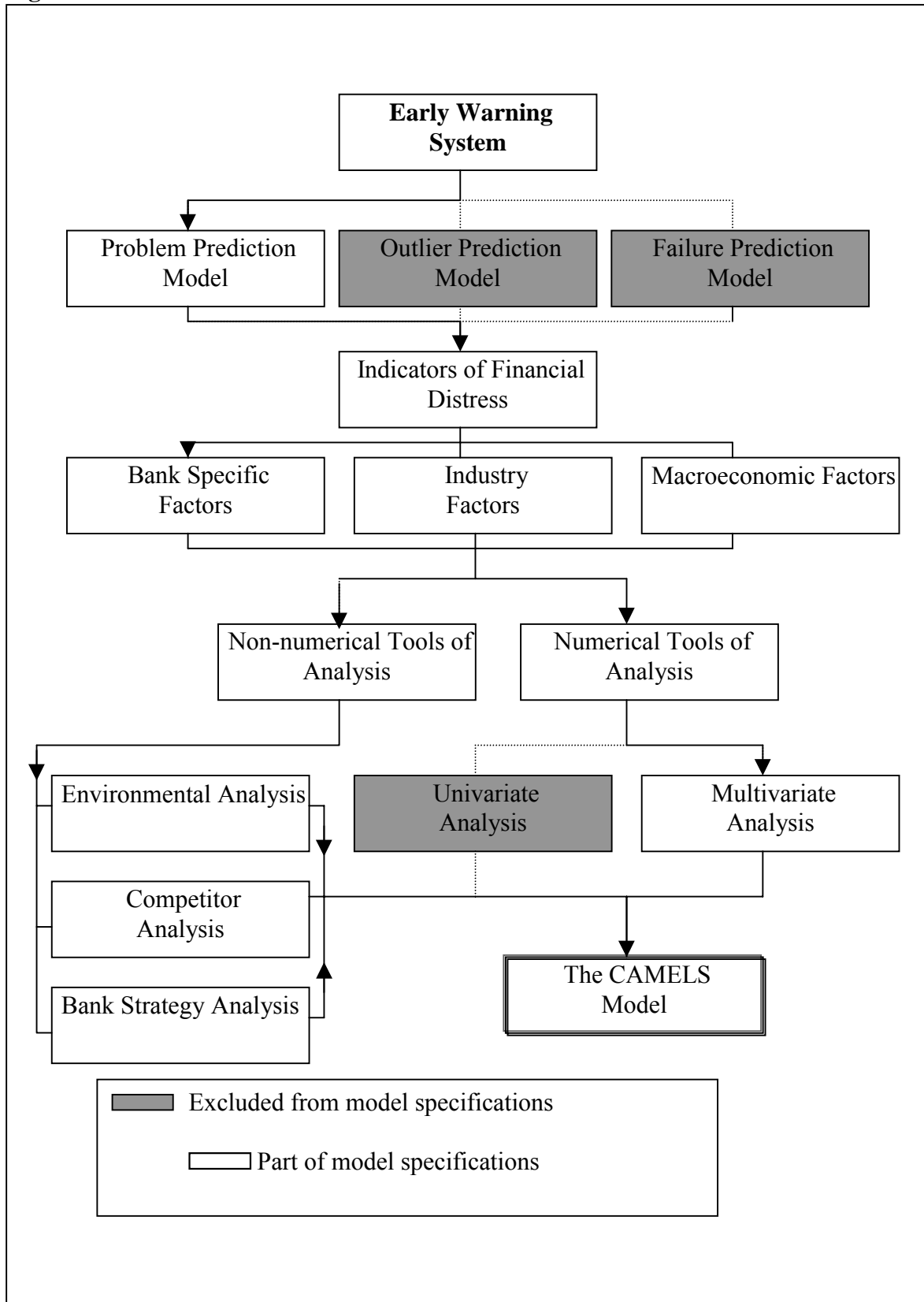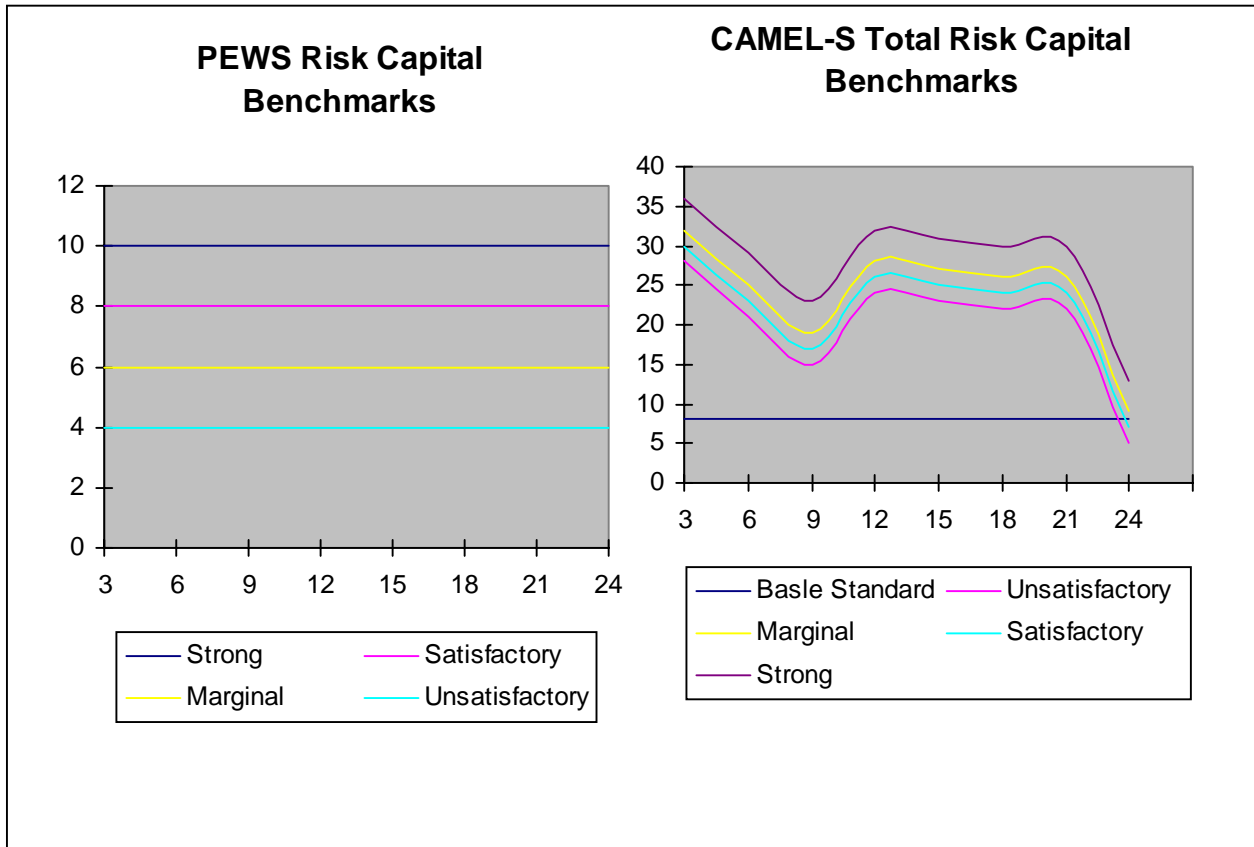
Figure 7   The proposed early warning system

Figure 8   The CAMEL-S Model

Figure 9   Comparision of PEWS and CAMEL-S benchmarks

PEWS Risk Capital Benchmarks

Legend: Strong, Satisfactory, Marginal, Unsatisfactory

CAMEL-S Total Risk Capital Benchmarks

Legend: Basle Standard, Unsatisfactory, Marginal, Satisfactory, Strong

Table 6   PEWS & CAMEL-S benchmarks

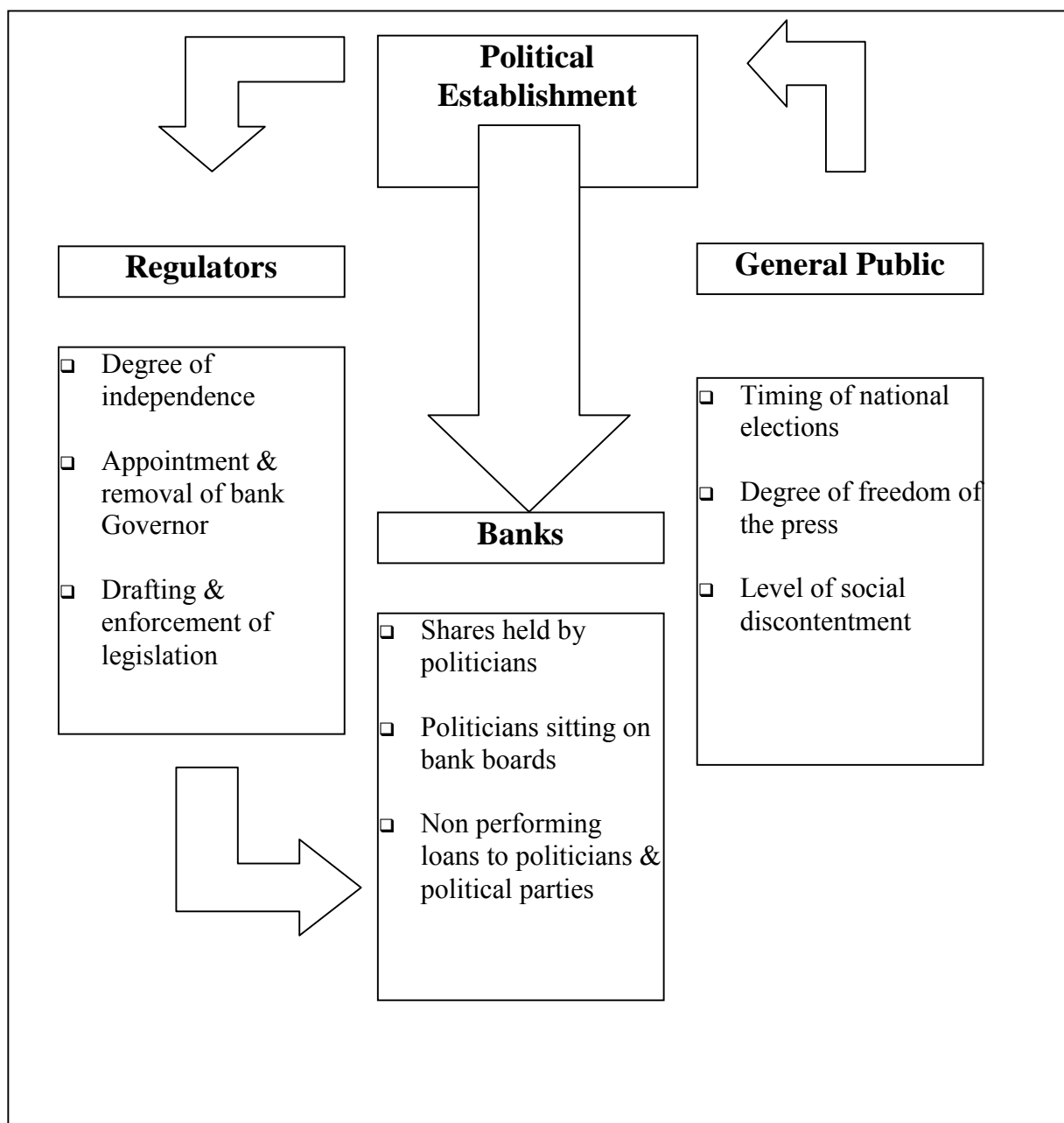| PEWS Ratios	CAMEL-S Approach	Rating	Classification
10% and above	Plus 4% above IM	1	Strong
8% - 9.9%%	Plus 2% above IM	2	Satisfactory
6.0% to 7.9%	Industry median (IM)	3	Fair
4.0% to 5.9%	Minus 2% below IM	4	Marginal
3.9% and below	Below 4% IM	5	Unsatisfactory

Figure 10   Forms of political influence

Figure 12   The CAMEL-S early warning system

BANK SPECIFIC INDICATORS

INDICATORS

FINANCIAL ANALYSIS

- Capital
- Asset Quality
- Earnings
- Liquidity

- Political
- Economic

- Competitive
- Development

Strong

Satisfactory

Possible Emerging Problem

Problem