DISSERTATION

THE EFFECTS OF THE BANK SUPERVISORY FRAMEWORK ON BANK PERFORMANCE: POLICY IMPLICATIONS FOR BOTSWANA BASED ON A CROSS-COUNTRY ANALYSIS OF A GROUP OF AFRICAN COUNTRIES

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WE HEREBY RECOMMEND THAT THE DISSERTATION PREPARED UNDER OUR SUPERVISION BY MATLHODI M. SERERO ENTITLED THE EFFECTS OF THE BANK SUPERVISORY FRAMEWORK ON BANK PERFORMANCE: POLICY IMPLICATIONS FOR BOTSWANA BASED ON A CROSS-COUNTRY ANALYSIS OF A GROUP OF AFRICAN COUNTRIES BE ACCEPTED AS FULFILLING IN PART REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY.

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ABSTRACT OF DISSERTATION

THE EFFECTS OF BANK SUPERVISORY FRAMEWORK ON BANK PERFORMANCE: POLICY IMPLICATIONS FOR BOTSWANA BASED ON A CROSS-COUNTRY ANALYSIS OF A GROUP OF AFRICAN COUNTRIES

Very few of the empirical studies used to determine the relationship between bank supervision and the performance of banks have included variables that explicitly capture bank regulatory or supervisory framework. This research is aimed at filling that shortage by empirically estimating the impact of the structure, the independence and scope of bank supervision on bank performance. Those variables are investigated alongside other determinants of bank profitability in the ordinary least squares models used to establish the impact of the supervisory framework on the performance of banks in Botswana and the rest of the sampled countries.

As it is common in many other African countries, banking in Botswana is a very important industry in the mobilization of resources from savers to borrowers, hence banks play a critical role in funding investments that generate economic development and growth. Banks in Botswana are also important in providing a conduit through which the central bank can achieve its monetary policy objectives. Based on this importance of banks, the banking industry remains amongst the most highly monitored and regulated industries in Botswana and throughout the world.

The primary objective of this thesis is to examine how bank profits and net interest margins respond to a supervisory authority which meets at least one of the following criteria; it operates in solitude, it is politically independent, its scope of responsibility extends to non-bank financial institutions and the central bank is either the supervisory authority or it is part of it.

The findings of the research suggest that the existence of a single bank supervisor reduces the financial returns of banks, while the participation of the central bank in bank supervision improves profits and net interest margins of banks. Extending the scope of the supervisory authority to non-bank financial institutions and protecting the bank supervisor from political influence did not produce any significant results.

Some regulatory variables that govern the activities of banks and institutions that conduct bank supervision were investigated. Regarding banks, a variable that allows for the investigation of how a tighter restriction on the mixing of banking with commerce impacts bank performance, was considered. Also, the relationship between bank performance and a variable that depicts the strict limitations on the cross-ownership between banks and non-bank financial institutions was assessed. A variable for explicit deposit insurance showed the influence of mandatory deposit insurance on the performance of banks. Finally, an investigation of the impact of the use of mandated subordinated debt in bank capital on bank profits and net interest margins was made. Among these variables, the strict control of ownership between banks and firms was detrimental to profits in terms of the returns on equity, while mandatory subordinated debt slightly enhanced net interest margins. The other two bank regulatory variables of the cross-ownership between banks and non-bank financial institutions and formal

deposit insurance were insignificant. Discretionary power was the only regulation on bank supervisors included in the model and it produced insignificant results for all measures of bank performance.

A general conclusion about the results suggests that regulations on banks represented by the tight restriction on mixing banking and commerce and the use of mandatory subordinated debt have an influence on bank profits and net interest margins. Furthermore, the structure of supervisory framework in terms of the participation of the central bank in supervision and the number of supervisors were shown to have a considerable effect on the performance of banks, while the independence and the scope of the bank supervisor were insignificant.

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DEDICATION

To

mama and papa

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CHAPTER 1

INTRODUCTION

1.1 The Importance of the Study

In many African countries financial sectors are predominantly small and dominated by commercial banks, with a low level of development in the money and stock markets. In the sample of 17 countries for this study including: Botswana, Egypt, Ghana, Kenya, Lesotho, Malawi, Mauritius, Morocco, Namibia, Nigeria, Senegal, South Africa, Swaziland, Tanzania, Tunisia, Zambia and Zimbabwe, only Botswana, Mauritius and South Africa have been described as having well developed financial sectors.

For most countries the central bank, as a mother bank, is the overseer of the financial sector. Central banks are usually in charge of monetary policy, payment systems, stability and soundness of the banking industry and the rest of the financial sector. Also, central banks have a goal of promoting economic development and growth. Most of the central banks are also in charge of bank regulation and supervision, although any other designated authority, which may either be private or governmental can conduct the latter tasks.

Generally the achievement of the rest of the objectives of supervision depends on the success in achieving the goal to keep the financial sector solvent and stable. For

many less developed countries, the stability of the financial sector depends upon the condition of the banking sector. Therefore the soundness and stability of banks is one of the major objectives of bank supervisors. In fact, there has been an increasing recognition among policy makers that prudential regulation of banks can have a positive impact on the stability and efficiency of the financial system. As a result, stringent rules and regulations have been enacted to monitor and govern the behavior of banks to ensure that they are in good financial standing. However, given the multiplicity of the central bank or any other supervisor's goals, there is a possibility that in pursuit of one goal, a conflict of interest might arise resulting in negative impact on other goals.

Some rules and regulations are aimed at limiting the risk in bank investment portfolios in order to achieve the goal of making banking assets safer and to maintain stability in the financial system. However, the same rules can deprive banks of the opportunity to invest in ventures of high return that would raise their profitability, since higher risk is associated with higher yields. Thus, the health of the financial sector also depends on the quality of bank supervision. A prudent watch and a timely assessment of bank capital are required to guarantee good liquidity position and soundness of banks. In other words, there needs to be a balance between the requirement for banks to hold safer assets and allowing them to undertake some risky investments that promise higher returns so that they may remain competitive and profitable.

The solvency of banks depends on their ability to minimize the risk of their assets and to raise their earnings so that they can continue to redistribute funds to various investors. At the same time banks should be able to honor obligations to their creditors, especially depositors. As indicated earlier, there exist regulations that limit the means

through which banks can enhance their profitability. Therefore it is imperative that the advantages and disadvantages of bank regulation and supervision be assessed to promote policies that are compatible with the intended sound banking and financial systems. This move is consistent with the Core Principles for Effective Banking Supervision[1], set by the Basle Committee on Banking Supervision[2], aimed at guiding individual countries on how to strengthen their supervisory arrangements to promote overall macroeconomic and financial stability.

The purpose of this study therefore, is to determine empirically, the impact of the bank supervisory framework adopted in a group of African countries on bank performance, and to make relevant policy recommendations with a special emphasis on Botswana. The following list summarizes the importance of the intended study:

(i) The subject of structure, scope and independence of the supervisory structure on bank performance is under researched, therefore this study would add to the currently scanty empirical information on the subject.

(ii) A similar study with respect to any African state has never been performed, therefore conclusions obtained would provide supervisory authorities with empirical evidence on the effects of supervision on banking.

(iii) A comparison of results from a study based on African countries would be made against the results obtained from a study comprising a larger sample of 55 worldwide countries by Barth et al. (2002).

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[1]The Basle Core Principles were drawn in close collaboration with supervisory authorities in fifteen emerging market countries and include input from many other supervisory authorities throughout the world, as stated in the Bank of International Settlements Press Release, April 9, 1997.

[2]The Basle Committee on Banking Supervision is a Committee of banking supervisory authorities which was established by the central bank governors of a group of ten countries in 1975.

Supervision will be assessed in terms of the structure of the supervisory framework with two components. The first has to do with the participation of the central bank in the supervision of banks and the other is concerned with the existence of a single bank supervisor. In addition, the scope of the supervisory body is considered to determine if extending the responsibility of the supervisor to non-bank financial institutions mattered. The last aspect of supervision framework to be looked at is independence from political influence.

Two general hypotheses were tested, the main one pertaining to the importance of aspects of supervision in determining profits and net interest margins of banks. This more general hypothesis was tested through four individual hypotheses which can be summarized in the following statements: (i) the participation of the central bank in bank supervision, (ii) having only one bank supervisor, (iii) extending the scope of bank supervisor to non-bank financial institutions and (iv) the independence of the bank supervisor, all have a favorable impact on the profits and net interest margins of banks. The results obtained from the Ordinary Least Squares models used to test those hypotheses showed that if bank supervision is conducted by the central bank, the profitability of banks increased. The existence of a single supervisor eroded bank profits and also narrowed their net interest margins. Thus the structure of the bank supervisory framework affected bank performance. However, the independence and scope of the supervisor were insignificant in both the profit and net interest margins models. The same results were obtained for the joint significance of the two variables, leading to the conclusion that supervisor independence and scope do not affect the performance of banks.

1.2 The Role of Banks in African Countries

For most developed and less developed countries, traditional or conventional banks form the core of financial sectors, as noted by Chami et al.:

> In developing and emerging market countries, banks are the dominant financial institutions. Many of these countries are characterized by low per capita income and asset levels, ..., lax accounting standards, and a corporate sector dominated by small, family-owned businesses....Since the required infrastructure is lacking in developing countries, it is not surprising that banks and other financial intermediaries dominate the financial scene and capital markets are slow to develop. (Chami et al. 2003, 4)

In most African countries the money and stock markets are currently underdeveloped, hence commercial banks play a major and important role in regional economies. Therefore, a fragile banking system which may be exacerbated by low profitability may cripple the entire financial system of the affected country or even spill over to other countries, especially in cases of international banking. Banks hold a substantial amount of deposits from households, private companies, government sectors and other non-bank financial institutions. In performing the function of financial intermediation, banks redirect funds from savers to borrowers, promoting macro-economic activity that normally drives economic growth. Banks are also a channel through which monetary policy can be implemented and its goals achieved, as banks can be used to regulate the money supply while conducting their primary function of mobilizing financial resources in the economy.

As long as banks continue to be a pillar in the mobilization of resources and the transmission of monetary policy, the exploration of various determinants of bank performance remains equally important. Doing so would allow for a design of policies

that are compatible with the promotion of efficient and solvent banking systems that also protect the interests of the economy as a whole. It is therefore fitting to assess how various supervisory policy measures affect bank performance in Botswana and the rest of the countries in the sample. This study attempts to analyze this important policy issue.

1.3 The Importance of Bank Regulation and Supervision

Since the past thirty years, bank failures attributable to macroeconomic shocks and increased domestic and foreign competition in the banking industry, have become common around the world. In fact, Caprio and Klingelbiel (2002) listed a total of 117 banking crises occurring in 93 countries since the late 1970s. The crises included in the list occurred in forty African countries, 10 of which are included in the sample of this study[3]. The rest of the crises occurred in countries of various economic development statuses. Honohan has noted that bank failures occur in both developed and less developed countries:

> The prevalence of financial system failure has been at least as great in developing countries and transition countries as in the industrial world. We describe the contrast between epidemics of the macroeconomic and microeconomic varieties, and between these and the syndrome of endemic failure, typically associated with pervasive government involvement in the banking system. It is the first macroeconomic type that has been most familiar in the industrial world, but the others have been common in developing and transition economies. (Honohan 1997, 1)

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[3] Botswana is included. The listing describes the banking crises in Botswana as small, nonsystematic and within the borders of the country. The timely detection, correction and containment of the crises only to problem institutions were attributable to the good governance, regulatory and supervisory skills of the Bank of Botswana, the central bank. Thus bank supervision is also seen as an important aspect in the Botswana economy.

The new structure of global banking characterized by universal, very large and highly diversified banks which are gradually displacing traditional banking practices, are likely to blame for the high risk activities and the cutthroat competition leading to worldwide banking crises that have become so common. Deregulation and various other shocks have also been blamed for the instability experienced in the banking sector. It is this notion that deregulation contributed to the calamity that has characterized the banking industry that motivated the objective of this dissertation, which is an attempt to test empirically if indeed regulation and supervision play a role in bank performance.

The special status of banks as the most important sub-group of financial institutions, the need to protect the interests of consumers and the protection of the entire financial system from systemic risk, has led to highly regulated banks and financial sectors in many countries. Thus the regulation and supervision of banks have become inevitable in the quest for stability and the protection of consumer interests in the banking industry. Regulators set different goals to be achieved through the control and limitations they impose on financial institutions. The main idea behind bank supervisory arrangements is to cushion savers and other bank creditors against the moral hazard, the principal-agent and the adverse selection problems at the hands of banks. All three problems result from the asymmetry of information between creditors and their banks. The problem of information asymmetry will be discussed in details in Section 3.1 of Chapter 3.

Kane reinforces the idea that bank regulation is aimed at ensuring that banking businesses are fair to the society by protecting the interests of those who have money at stake in banks, but not involved in the decisions taken to invest those funds:

> "Economic theory offers two complementary rationales for regulating financial institutions. Altruistic public-theories ... for increasing fairness and efficiency across society as a whole....Agency-cost theory recognizes that incentive conflicts and coordination problems arise in multiparty relationships and that regulation introduces opportunities to impose rules that enhance the welfare of one sector of society at the expense of another." (Kane 1997)

The nature of the regulatory framework adopted has important connotations on the structure, scale, scope, efficiency and other performance related attributes of the entire financial system. Thus bank-supervision restricts the behavior of banks by limiting the amount of credit they can extend to borrowers, and in general, narrows and controls the type of business activities that banks may conduct. The main idea behind restrictions placed on bank behavior is to minimize the risk of bank assets by imposing punitive measures on non-compliant banks, as noted by Spong:

> Bank regulators...control banking risks and thereby protect depositors and ensure financial stability. Banks...are restricted to certain activities and must maintain adequate capital relative to asset and operational risks....They are regularly examined and bank supervisors will impose tighter restrictions on banks if their condition declines. (Spong 2000, 65-66)

That said it is worth mentioning that supervision must not hurt regulated financial institutions by imposing unwarranted costs, possibly producing adverse effects. In fact Spong further noted that limiting the types of activities that banks can undertake denies them opportunities to engage in more profitable transactions. Those restrictions can end up eroding the ability of banks to compete with other players in financial markets.

Regulation induced costs on banks may force the latter to shift the entire burden on to consumers of their products by way of elevated service fees and transaction costs. Banks may even be forced to eliminate some of the services they used to provide to their clients. Jordan et al. (1994) argued that costs of compliance with regulatory requirements

and prohibitions imposed substantial costs. Such costs are borne by investors in terms of reduced value of their investments, workers in the form of reduced salaries and customers in terms of high borrowing rates and lower savings rates.

The high costs of operation may also force banks to eliminate some activities, denying consumers services that they might so much need. Satta (2000) concluded that compliance costs of regulation led to a reduced financial system efficiency in Tanzania. He further noted that in some cases banks were forced to suspend some of their services in order to meet submission deadlines for financial reports, and thus forfeiting income-generating opportunities. Regardless of the existence of both explicit and implicit costs, supervisory mechanisms must not be too lenient to allow banks to engage indiscriminately in activities that might lead to a collapse of the banking sector, with a probable adverse effect on the economy as a whole.

A variety of outcomes are possible from the pursuit of the whole array of regulator and supervisor objectives: Favorable repercussions are realized if the achievement of objectives results in a sound, efficiently running financial system where by consumers' interests are protected without hindering financial institutions from operating profitably and competitively. Adverse results are also possible if regulation has an undesirable impact on the performance of financial institutions. This situation may arise if regulations are stringent enough to deny institutions opportunities to pursue profitable and worthwhile investment ventures. It is therefore necessary to establish regulatory structures that are not only effective but are also efficient in achieving goals of regulators and those of the regulated institutions. This scenario is possible if clearly defined non-contradictory regulator objectives exist, and are supplemented by an equally

effective and efficient supervisory and enforcement mechanism. The latter would through moral suasion or forcefully, foster adherence to prudent behavior by financial institutions as per dictates of relevant regulations.

Despite the apparent case for the establishment of a vigilant authority to monitor activities of banks, conflicting cases in favor or opposition of any type of bank regulation exist. Thus, even though, banking regulation and supervision has become a crucial factor in banking industries worldwide, "there is no consensus in academe on why should banks be regulated, how they should be regulated, and whether they should be regulated at all." (Dewatripont and Triole 1994, 29). Countries around the world are likely to conduct their supervisory duties differently from each other and for different purposes, since there is no common ground set to harmonize bank supervision.

It is common in less developed countries for the central bank to be empowered by statute to regulate banks and, in some cases, Non-Bank Financial Institutions (NBFIs). In developed countries, other governmental or private organizations have been established to conduct regulation and supervision of banks and NBFIs, with or without the participation of the central bank. For example, the European Union has a mixed situation where by central banks in some member countries play the supervisory role, while some do not:

> The European system of central banks is composed of the European Central Bank (ECB) and twelve national central banks. Some of these national central banks have responsibility for banking supervision, and some do not. There are separate national agencies for banking supervision that are independent of the central bank. (Schinasi 2003, 14)

However, by virtue of being lenders of last resort, central banks are likely to be supervisors or to take part in the supervisory authority of banks, due to the need to have accurate information about the financial health of banks.

Issues of bank supervision are important in the promotion of a sound financial infrastructure for individual African countries and for the world as a whole. However, if wrongly executed banking supervision may tend to be detrimental to the soundness and the efficiency of the financial sector. Therefore, examining the outcomes of supervision on bank performance is inherently crucial. In short, the existing discord about why, how and who should be responsible for supervising banks makes this study worthwhile in that it would reveal how supervisory structures that are in place in the sampled countries, affect bank performance. Furthermore, the results of the study would provide guidance on how policies relating to the bank supervisor and regulator can be formulated or enhanced to achieve the goal of a healthy banking sector, while at the same time safeguarding the welfare of depositors. There is no doubt that more studies in this area are needed and perhaps this study with a special emphasis on Botswana would pave a way to future research on the subject.

1.4 Outline of the Study

Chapter 2 provides literature review on some important issues relating to banking and bank supervision. Section 1 attempts to show why bank activities should be controlled and monitored, thus a justification for regulation and supervision of banks. The second section briefly discusses measures that contribute to efficient examinations of

banks and to the enforcement of reasonable constraints on bank behavior. The role of market discipline in limiting risk taken by banks and how investors can use market information about banks to evaluate bank risk is discussed in Section 3. If market participants penalize banks with high levels of risk, then market discipline can complement the efforts of traditional banking supervision establishments in controlling bank risk. Section 4 discusses the determinants of bank profitability, referring to studies on the factors that influence bank performance, and emphasizing on the effect of bank supervision on the performance of banks. Those past studies have provided the basis for the choice of control variables used in this study to establish the impact of the framework of bank supervision on bank performance. The final section reviews the existing literature on the core of this study, which is the relationship between supervision and bank profitability plus net interest margins. As such, this section provides the foundation for the methodology of the study. The important factor to note from the last section of Chapter 2 is that, even though various aspects of bank supervision are believed to influence bank performance, very few empirical studies have been conducted to test that perceived relationship. This study therefore, will supplement the deficient empirical evidence on issues relating to the influence that the structure, scope and independence of supervision have on the performance of banks.

The third chapter explains the ordinary least squares model used to test the hypotheses of the study. It also discusses all control variables used, providing definitions and the expected impact on bank performance. In addition, regulatory and supervisory variables are defined, including the explanation on how the dummies representing each one of them were computed. The expected signs of regulatory and supervisory

coefficients are also discussed. The chapter goes on to discuss the joint significance test to be conducted on supervisory variables that will individually produce insignificant results. A discussion of the two sets of hypotheses of the study giving details on how the models will be used to test them follows. The first set has to do with bank supervisory variables and constitutes the primary hypotheses which are the central part of the study. The final set includes secondary hypotheses relating to banks and the supervisory authority regulatory variables. The chapter concludes by discussing different specifications of the models to be tested in the study.

Chapter 4 introduces the sample and data used in the study. Both bank specific and country specific variables are used. The diversity of the sample is evident in the fact that countries of different levels of economic and financial development are included. Also the 158 banks in the sample vary in asset size, cost efficiency and performance levels, to name a few.

Chapter 5 discusses the results of the models and compares them with those obtained from other studies of determinants of bank performance based. Both bank level and country level variables produced some significant results, suggesting that the two categories of variables matter for bank performance. Most importantly, supervisory variables relating to the structure of the framework of supervision produced significant results, while the independence and scope variables were insignificant. The Chapter then discusses the joint significance of supervisory variables that individually tested insignificant, concluding with the discussion of the economic significance of supervisory variables that produced significant results.

A summary of the purpose of the study and conclusions on the role of control variables and supervisory variables are discussed in Chapter 6. In general, there was no indication that the results of this study were influenced by the fact that the sample consisted only of African countries. Thus the results conformed to those of studies based elsewhere. Furthermore, policy recommendations for Botswana based on the results of the study are discussed. Two main issues were raised. The first calls for the retention of the status quos where by the Bank of Botswana, or the central bank, supervises banks. Doing so has the potential to enhance bank profitability and net interest margins as suggested by the results of this study. However, based on the findings that a single supervisor was unfavorable to bank performance, an alternative supervisory authority was recommended to complement the role played by the central bank. The final section of the chapter provides suggestions for future research intended to improve on limitations of this study with an ultimate goal of improving the accuracy and relevance of the results.

CHAPTER 2

LITERATURE REVIEW

2.1 Why Advocate Bank Regulation and Supervision?

As a remedy to financial distress that countries have experienced through the years, a common trend of prescribing prudential bank supervision has evolved. Risk adjusted deposit insurance schemes have also been created to guarantee the safety of depositors funds in cases of bank failure. The introduction of risk adjusted deposit insurance alleviates the moral-hard problem inherent in government funded insurances. With the latter, banks might have an incentive to increase their risk so as to maximize their payoff from the deposit insurance. Furthermore, standardized capital requirements have been established to minimize the risk of bank assets, which in turn reduces potential losses to creditors when banks are faced with liquidity crises. Mishkin (2001) pointed out that a combination of prudential supervision and regulation can reduce problems of information asymmetry between depositors and banks, improving financial stability.

Bank supervisors periodically carry out bank examinations as a way to deter banking institutions from conducting their businesses in a way that exposes their creditors, mostly small depositors, to high risk. The ultimate objective of supervising

banks is to prevent bank failures that may devastate the financial sector and economic development.

Adverse repercussions on the entire economy that may follow from bank failure have led to highly regulated and supervised banking industries all over the world. Banks are perceived to be more prone to failure than any other industries because the nature of their business makes them highly susceptible to failure. The problem of contagion also helps spread troubles facing one bank to the rest of the banking sector, affecting even financially sound institutions. In addition, the moral hazard problem which manifests itself through the principal-agent problem may expose a bank to failure. If a bank assumes the role of an agent acting as a custodian of depositors' funds indulge in risky behavior which jeopardizes investments of depositors, the principal in this case, then there is a principal-agent problem.

The fact that the banking industry has some peculiar features absent from other industries makes banks more vulnerable to failure than other types of businesses. Some important reasons why banks differ from firms, making them more likely to fail are that banks are susceptible to failure and also, the possibility of systemic risk and moral hazard problems are inherent in the banking industry.

a) Why Banks are Susceptible to Failure?

Generally the capital base of banks mostly constitutes debt rather than equity. Empirical evidence has shown that the lower the capital-asset ratio, or the more leveraged a bank is, the more vulnerable it is to bankruptcy. However, other types of businesses tend to have higher capital-assets ratios, placing them in a better position regarding the

absorption of losses in times of liquidity crises. In this study the equity-assets ratio only averaged 11.9 percent for the entire sampled set of banks, whereas the loan-asset ratio averaged 45.0 percent. The fragile situation of banks arises from the fact that they hold most of their debt in the form of deposits payable on demand, while at the same time their loan portfolio is mostly long-term. In the face of a sudden high demand for deposits, or a run, the bank cannot recall long term loans or mortgages given the terms of contracts already made with borrowers. At the same time the capital base is too low to meet liquidity demands placed on a bank. In such a case the bank will simply fail to meet obligations to its creditors. A cash strapped bank might find itself forced to quickly dispose of both profitable and non-profitable assets at indiscriminate discount prices in order to raise some liquidity. Diamond and Dybvig described the sudden demand for deposit and the possible losses a bank is likely to experience if it sells assets in haste so as to generate the necessary liquidity as follows:

> During a bank run, depositors rush to withdraw their deposits because they expect the bank to fail. In fact, the sudden withdrawals can force the bank to liquidate many of its assets at a loss and to fail. (Diamond and Dybvig 1983, 401)

The urgency which the bank experiencing a run is forced to dispose of its assets and the possible losses there from, have also been described by Kaufman, who stated that:

> ...hurried asset sales of opaque and non-liquid earning assets with potentially large fire-sale losses to pay off running depositors. (Kaufman, G., G. 1995, 3)

On the contrary, most non-banking businesses do not normally experience runs. Once a transaction with the customer is completed, the relationship between the two ends, even if it continues the customer is more likely to be the firm's borrower rather than

creditor. The possibility of runs on banks which is unlikely in other industries is an important distinguishing feature between the two, making banks more vulnerable to failure.

Bank regulation and supervision are seen as necessary by many to instill confidence in depositors about the safety of their savings, in order to prevent any doubts that may culminate in bank runs. The lack of creditor-debtor relationship between clients of a business firm and the firm itself, justifies the fact that other industries are not as highly regulated as banking.

b) Systemic Risk

Bank panics are a banking phenomenon that leads to bank runs which if not contained on time, might lead to systemic risk. Panics in the banking industry occur if depositors get hold of information or even just hear rumors about the capital loss of their bank, prompting them to demand their deposits suddenly and rapidly. That is, depositors actually run on their banks. On learning about a run and perhaps a collapse of one bank, depositors at another bank will also panic with fear that their bank might be facing liquidity problems too, hence they will run on their bank as well. The process of contagion in which troubles of one bank extend to other banks might continue until all banks in the banking system are affected, even healthy ones with no signs of insolvency, are run on. In fact, runs can possibly spill over to the rest of financial institutions. In a nutshell, panics that cause runs on the banking industry or even the entire financial sector arise from asymmetric information concerning the safety of bank assets.

Systemic risk therefore, is a result of turmoil in the financial sector that can halt the payment systems and the channeling of funds from creditors to investors, affecting economic activity and development. Various definitions of systemic risk have been coined and all of them emphasize the possibility of difficulties faced by one bank spreading to other banks and affecting the whole economy. The definition presented by Bartholomew and Whalen stresses the fact that systemic risk diffuses in the economy rather than being contained to a single institution. Systemic risk is:

> ...an event having effects on the entire banking, financial, or economic system, rather than just one or a few institutions. (Bartholomew and Whalen 1995, 4)

In Mishkin's definition it is clear that systemic risk affects investment, hence economic activity.

> The likelihood of a sudden, usually unexpected, event that disrupts information in financial markets, making them unable to effectively channel funds to those parties with the most productive investment opportunities. (Mishkin 1995, 32)

Finally, the Bank of International Settlements defines systemic risk as an event that may have crippling effects on the entire financial system, bigger than the problems that triggered the whole reaction. In this case systemic risk is defined as:

> ...the risk that the failure of a participant to meet its contractual obligations may in turn cause other participants to default with a chain reaction leading to broader financial difficulties. (Bank of International Settlements 1994, 177)

Implicit in the different definitions of systemic risk, is its potential to stretch beyond the banking system causing instability in the entire economy. Banks are closely related to economic development since they provide a medium though which depositors' funds can be used by borrowers to finance investments. The relationship between the

banking business and economic development is captured in the following statement by Diamond and Dybvig:

> In a panic with many bank failures, there is a disruption of the monetary system and a reduction in production. (Diamond and Dybvig 1983, 401)

On the contrary, if one firm in a given industry fails, it is good news for its competitors since they may get an opportunity to broaden their market share, or even to raise their prices if the collapse of the other firm led to shortages of supply. The problems experienced by one firm do not spread to other firms, and normally the rest of the economy will function as usual. The major role that banks play in the macroeconomic aspects of the economy and the fear of contagion and finally systemic risk are at the roots of arguments for bank supervision and regulation.

c) Moral Hazard Problems

The asymmetry of information means that some players in the market have information that the rest of the players that they enter into contractual relationships with do not have. Those who have the information have the incentive to act in a way that is detrimental to parties without that information. In relation to banking, depositors who assume the position of bank creditors do not have full information regarding the safety of bank assets and they only have to rely on the little information that banks divulge to them. The bank on the other hand may conceal any information that could signal liquidity problems to depositors and only disclose data and statistics that would make savers comfortable with its financial position, so as to remain attractive to investors. In this case depositors face the principal-agent type of moral hazard problem at the hands of

banks. Savers are principals and bank managers are unscrupulous agents. The underlying cause of the principal-agent problem stems from the fact that, bank managers do not feel obliged to minimize the risk of bank assets, as Hubbard noted:

> ...this type of moral hazard problem may arise when managers do not own the firm's equity and thus do not have the same incentive to maximize the firm's value as the owners do. (Hubbard 2003, 269)

To be more specific, in banking the principal-agent problem arises from the fact that the agent is only a custodian and not the owner of the principal's assets. Banks therefore, can invest in risky ventures since the net worth of the company belongs to depositors, and the losses will accrue to the latter as principals, rather than to banks themselves.

Generally bank creditors do not have full information on how banks invest their funds, hence they face a risk of losing their deposits. It appears that since depositors are bank creditors they must be motivated to monitor bank activities in order to have a clear perception of the safety of their savings. However, a majority of bank creditors are just small savers who do not have the technical know-how to gather, absorb, process and evaluate information about the risk level of banks, even if the information was readily available. The need to protect depositors' interests is also one of the primary reasons for the establishment of rules, regulations and supervisory agencies aimed at constraining the behavior of banks with the ultimate goal of minimizing their risk. Morgan emphasized the asymmetry of information between depositors and bank management, and the need for bank regulation and supervision to alleviate the problem.

> Banks are black boxes. Money goes in, and goes out, but the risks taken in the process of intermediation are hard to observe from outside the bank. Absent the steadying hand of government (deposits and payments insurance, lender of last

> resort, supervision and regulation of bank risk-taking) the opacity of banks exposes the entire financial system to bank runs, contagion, and other strains of 'systemic risk'. (Morgan 2002, 874)

The possibility of the principal-agent problem between bank creditors and banks is one more justification for tight control and monitoring of banks. However, business firms normally own company assets, and they are not just stewards. Customers only assume ownership of the products at the point of sale and become responsible for their safe keeping. It is this distinction between banks and firms that makes banks to be a more regulated and supervised industry than any other industry, since managers of firms have the incentive to protect the net-worth of their companies without any external pressure.

2.2 Conducting Efficient Bank Regulation and Supervision

Savers' interests are normally at stake in bank liabilities through deposit they hold with bank, yet they do not have full information on the risk level of banks. Therefore, it is common for governments to take part in the regulation and supervision of banks on the basis of comparative advantage in acquiring information and monitoring. Thus governments are generally considered to be efficient 'monitor of the monitors', collecting data that enables the prevention of banks from mismanaging funds and exposing outside stakeholders to excessive risks, (Dewatripont and Triole 1994).

In most cases, bank regulators and supervisors gather the necessary information during on-site examinations or inspections of institutions. Other measures like statutory bank reports, public disclosures and other off-site means of assessment may also be used.

Examinations provide supervisors with confidential information about banks' financial conditions and qualitative attributes such as internal controls and risk management procedures affecting risk profiles. However, for such information to be meaningful it should be timely and reliable. Therefore, the more frequent the examinations, the higher the probability that the risk status of a bank would not have changed significantly in between evaluations, rendering the gathered data currently valuable. Hirtle and Lopez recognize the need for bank supervisors to always posses up-to-date data when evaluating bank risk.

> The potential 'time decay' of bank examination information has been a concern for both supervisors and policymakers.... (Hirtle and Lopez 1999, 1)

However, the process of gathering necessary and timely information is costly, making the trade-off between the timeliness and costs of gathering information inevitable. In order to curb costs of frequent onsite examinations and the use of stale data, econometric models have also been used as part of off-site surveillance to predict bank failures. Such models give a picture of bank conditions signaling the need for an immediate or a future examination as affirmed by Meyer and Vaughan.

> ...One of the contributions of econometrics to bank supervision has been the estimation and simulation of models designed to provide supervisors with early warning of the banks that are most likely to develop serious problems in the future....Our analysis and other research demonstrated that econometric models dominate supervisory screens as predictors of bank failure and downgrades of supervisory rating. (Gilbert, Meyer and Vaughan 2000, 5)

As an example of the supervisor, attempting to always have relevant information on the financial health of banks, the Bank of Botswana which is the central bank, also uses onsite and offsite examinations to monitor banks. Routine checks on the Capital

Adequacy, Asset Quality, Management, Earnings, Liquidity and Market Risk Sensitivity (CAMELS) of banks are conducted so as to establish if prudential requirements are met regarding those measures of risk. Normally, onsite examinations on banks are conducted annually, but if at least twenty percent of depositors petition the central bank, examinations on the institution in question can be conducted anytime. Annual bilateral meetings are held between the Bank of Botswana and auditors of each of the regulated banks. In addition, trilateral meetings are held between every regulated bank, its auditors and the central bank. The purpose of the meetings is to reveal to the Bank of Botswana the risk level of bank assets, to discuss issues regarding compliance with regulatory requirements and to open a dialogue between financial institutions and their supervisory authority. To counter the problem of outdated information, monthly and quarterly statutory financial returns are required from each of the regulated institutions for a continuous assessment and evaluation of their risk.

2.3 Market Discipline versus Supervision

The idea that regulatory and supervisory forces are sufficient to ensure the soundness of the banking industry remains important, yet a contrasting view that market discipline can accomplish the same goal more efficiently, exists. The latter perception arises from the fact that with time banks have developed the ability to elude some regulatory and supervisory restrictions, making alternative measures to constrain bank behavior more desirable. Evanoff and Wall offer the following explanation to show why supervision is becoming ineffective in controlling bank risk:

> As financial institutions become more sophisticated and complex they have effectively arbitraged the existing capital requirements. They have become so good at avoiding the intent of capital regulation that the regulations have essentially ceased to be a safety and soundness issue for supervisors and have become more of a compliance issue. (Evanoff and Wall 2000, 1)

In addition to the problem of banks avoiding prudential regulation and supervision, there is also a problem of financial costs attached to physical bank supervision. Resources and time used in bank examinations and monitoring inflict a cost on bank supervisors which is a limiting factor in the frequency at which examinations are carried out. However, the liquidity status of a bank can change suddenly. Following a good rating by examiners, a bank can undertake an investment that could instantly put its liquidity and soundness in serious doubt. It may take a long time for examiners to conduct another examination on that bank, and during that substantial time lag the supervisors would still rate the bank as low risk. For bank monitoring to be effective, it should be carried out on a continuous basis, which is impossible for bank supervisors. This has also made it appealing to resort to alternative ways of guarding depositors against the moral hazard problems inherent in the banking business. An observation was made by Krainer and Lopez that, as a way of partially dealing with limitations in monitoring technology, bank supervisors are welcoming the idea of complementing their efforts by the increased use of market discipline.

> To partly address these limitations in their monitoring technology, bank supervisors are considering the expanded use of market discipline and financial information to supplement their efforts. (Krainer and Lopez 2002, 1)

Thus the realization of the deficiencies in the effectiveness of bank regulation and supervision has encouraged the willingness by bank supervisors to allow the use of

market discipline and market information as an additional medium of supervision. Even the Basel Committee on Bank Supervision recognizes the potential benefits of market discipline in the monitoring and control of bank risk by recommending the use of mandatory subordinated debt as one of the 'three pillars for future regulation'. This pillar that makes subordinated a mandatory component of bank capital, calls for more timely bank disclosures to provide the market with the necessary up to date information. The market would hence, be able to asses the data and make meaningful judgments about the financial standings of banks.

Market discipline can be defined as a situation in which bank creditors play an active role in controlling bank risk, rather than completely relying on government or official authorities to control and monitor banks. In their definition of market discipline, Martinez and Schmukler use costs faced by bank creditors as a motivation for them to be concerned about bank risk and impose punishment if necessary.

> Market discipline in the banking sector can be described as a situation in which private sector agents (stockholders, depositors, or creditors at large) face costs that are increasing in the risks undertaken by banks and take action on the basis of these costs (Berger 1991). For example, uninsured depositors, who are exposed to bank risk-taking, may penalize riskier banks by requiring higher interest rates or by withdrawing their deposits. (Martinez and Schmukler 1999, 1)

That is, in the absence of any guarantee schemes that creditors will always recover their funds from their debtors, the former have an incentive to exercise caution and restraint in normal business transactions with banks of differing levels of risk. The use of subordinated debt has been identified as the appropriate instrument for market discipline since it is believed that it would trigger an interest in bank creditors to thoroughly monitor the behavior of banks so as to protect their financial interests. Bank

regulation and supervision seem to have failed in dealing with the problem of high risk in banking assets, therefore the need to resort to alternative ways of controlling bank risk is intensifying suggestions that subordinated debt should be a substitute if not a complement of bank supervision.. Thus there is a general confidence that the use of subordinated debt can help to control bank risk, as inherent in the statement by Berger et al. who stated that:

> Proposals for narrow banking and for increased reliance on uninsured deposits and subordinated debt are based on the assumption that the market can more efficiently discipline bank behavior. (Berger et al. 1998, 2)

Subordinated debt can be defined as; "debt that is either unsecured and only backed by the integrity of the borrower or has a lower priority than that of another debt claim on the same asset or property." (http://www.advfn.com/money-words) Alternatively, it is "a debt which ranks below another liability in order of priority for payment of interest or principal." (http://www.lse.co.uk/financeglossary.asp?).

Regulatory properties of subordinated debt are inherent in the fact that if debt holders have the necessary information to rank banks according to their degree of risk profiles, they would penalize for the level of risk they are exposed to with a particular bank. Investors can control bank behavior by entering into more restricted debt contracts with banks they perceive to be of high risk. This will foster some sense of market discipline on the side of investors because the more restrictive the bank contract, the lower the returns for investors. Therefore, investors would only opt for restrictive contracts if warranted by the risk level of a bank. Similarly, banks would be encouraged to keep their risk level on check so that their debt contacts may be more flexible. In fact Goyal (2003) concluded that the relaxation of bank regulation has led to more restrictive debt contracts associated with higher bank risk. The rest of the market will observe

actions of investors regarding a particular bank, and they would act accordingly when doing business with a risky bank. The tendency for investors to accept debt of particular banks only if covenants are restrictive would signal to the market that the risk level of the bank is high. In such a case, new bank lenders will punish the bank for risky behavior. Even creditors which are currently in a business relationship with a bank with a rising level of risk can also penalize it for raising risk exposure, a fact noted by Der Weide and Kini:

> ...Private actors that have already invested in a bank will punish inappropriate bank behavior by selling their shares or bonds in the secondary market. A declining share or bond price in the secondary market will provide a signal to bank management and to third parties, such as bank regulators, that an institution is moving in an unhealthy direction. (Der Weide and Kini 2000, 212)

Thus in addition to prospective investors, existing investors too can facilitate market discipline. As soon as prices of bonds or stocks issued by a particular bank fall, the impact will be to sensitize the entire market about the riskiness of that bank. Information about risk levels of various banks will disseminate quickly around the market and in fear of 'punishment', banks will limit the amount of risk they take.

Some empirical studies have proven the efficacy of market discipline in the monitoring and controlling of bank behavior. Goyal concluded that "private risk bearing can replace some regulator monitoring" (Goyal 2003, 27), while Sironi (2000) found that the issuance of subordinated notes and debentures, prompted investors to rationally discriminate against high risk private European banks.

Another piece of evidence supporting the effectiveness of market disciple in bank monitoring is by Martinez and Schmukler (1999) who concluded that depositors in

Argentina, Chile and Mexico penalized banks for risky behavior by moving their savings from banks that took excessive risk to safer ones.

Even though, it appears that the use of subordinated debt is the answer to loopholes that exist in formal bank regulation and supervision, a few problems exist. For subordinated debt to encourage a sense of market disciple, banks are required to have enough equity capital to absorb any possible losses that equity holders may be exposed to. However, equity financing tends to be very costly for banks forcing them to issue debt to finance their ventures. Therefore, there is a high possibility that for most banks, equity financing will fall way too short of issued debt, which exposes shareholders to even more risk of losing their investments if the bank runs into liquidity problems.

The maturity structure of debt also has implications on the level of discipline the market can impose on banks, with more discipline associated with shorter maturities. However, the prevalence of too much short-term debt may erroneously cast doubts on the soundness of the banking sector, since it suggests that lenders are not confident that the bank would be in a position to meet long term financial obligations. Thus, a wrong interpretation of the safety of bank assets can create troubles for healthy banks. It is therefore important for players in the market to receive current valuations of bank assets, and be in a position to interpret data properly, so that only banks that are truly risky are the ones punished. Evanoff and Wall show how a misinterpretation of data can harm sound banks:

> ...depositors, lacking full information about the quality of the bank's assets may demand repayment and make a bank illiquid even though it remains solvent. (Evanoff and Wall 2000, 6)

This shows that even though the use of subordinated debt has been labeled as a viable instrument for market discipline, it is not a perfect option. The inability of the market to always have current information about the value of bank assets or the failure to process the available information accurately indicates that market discipline on its own can not be regarded as a substitute but rather a compliment for banking regulation and supervision. The fact that market discipline should work alongside bank regulation and supervision, was recognized by Berger et al. who reached a conclusion that:

> ...bond market participants, and equity participants all produce valuable complementary information that may contribute to improving the governance of large banking organizations. (Berger el al. 1999, 26)

2.4 The Determinants of Bank Profitability

A number of regression studies investigating factors that influence bank profitability or performance in general exist, yet they mainly concentrate on bank characteristics, financial structure and macroeconomic variables as their explanatory variables. As a result, there is a serious lack of studies that directly cover variables of bank supervision. So far only one study by Barth et al. (2002) goes a step further to explicitly include bank supervision framework variables, a deficiency this study aims to address.

Studies of bank performance appear in two categories: First are the single-country studies limited to only one particular country. And second are the cross-country studies, which are international studies examining bank performance in more than one country.

By far most of the single-country studies have been conducted on American banks. Neely and Wheelock (1997) assessed the performance on uninsured commercial banks in the US for the period 1980-1995. They found that the annual growth in per capita income of states enhanced bank returns. On the other hand, Angabazo (1997) examined a sample of banks in the US from 1989-2003 and concluded that equity, managerial efficiency, non-interest earning reserves and default risk led to higher interest.

Regarding African countries, Naceur (2003) investigated the determinants of Tunisian bank profitability based on a pooled data sample of 10 banks for the two decades from 1980-2000. Based on the results from an Ordinary Least Squares (OLS) regression analysis, he concluded amongst other things, that capitalization and the ratios of total loans and overheads to total assets significantly raised bank performance, both in terms of higher interest margins and return on assets. In addition, the macroeconomic indicators of inflation, the annual growth rate of gross domestic product per capita proved to be irrelevant to bank performance, while higher market concentration led to a poorer performance.

Elsewhere, Afanasieff (2002) also used OLS analysis on monthly data for all Brazilian banks in operation from February 1997 to November 2002. His main findings were that microeconomic or bank specific variables such as the ratios of; non-interest bearing deposits to total operational assets, operating costs and equity both to total assets, played a trivial role in determining interest rate spreads. However, macroeconomic factors such as the inflation rate and interest rate volatility significantly affected interest margins. Guru et al. (2002) sampled 17 Malaysian banks from 1886-1995, and they found that lower costs faced by a bank and higher inflation led to a rise in profitability.

To name a few international studies, Abreu and Mendes (2002) used OLS to investigate the determinants of bank interest margins and profitability for four European Economic Community member countries for the years 1986-1999. Their results revealed that operating costs as a fraction of total assets increased spreads while depressing profits in terms of return on assets and return on equity. However, inflation hurt both profitability and spreads, while higher capitalized banks experienced higher spreads and higher profits. Barth et al. (2002) carried out a study on 55 countries from allover the world, covering 2,300 banks in those countries. They also used OLS to establish the relationship between bank profits and bank characteristic variables, macroeconomic variables, regulatory variables and the bank supervisory authority variables of scope, structure and independence. Bank profits measured as the ratio of pre-tax profits to total assets were hurt by customer plus short-term funding and non interest earning assets, each as a proportion of total assets. Concentration and the ratios of overheads and total loans to total assets were insignificant. On the other hand, the ratio of equity to total assets and the tax rate substantially raised profits. This was also true for the macroeconomic variable of real gross national product per capita, yet the growth rate of the gross domestic product was insignificant.

Demirguc-Kunt and Huizinga (1999) are the pioneers of the ordinary least squares model employed in most of the studies of factors influencing bank profitability mentioned above. They devised a model in which bank performance in terms of net interest margins and return on assets are linearly dependent on an array of internal factors or bank characteristics, and external factors including macroeconomic variables and the financial structure variables. Based on a sample of more than 80 countries worldwide for

the period from 1988-1995, they found that among bank characteristics, customer plus short term funding enhanced performance, while non-interest earning assets and total loans both as a proportion of total assets, were detrimental to bank profitability. Annual inflation and real interest rates are also some of the macroeconomic factors they found to be influential on bank performance.

2.5 The Relationship Between bank Supervision and Bank Performance

There is no doubt that there is a correlation between the frameworks of bank supervision and the performance of banks. It was discussed earlier that regulation might be to the benefit or detriment of the financial sector in that it affects the structure, scope and scale of banks. In the U.S. the passage of the Gramm-Leach Bliley Financial Modernization Bill of 1999 (GBLA) repealed the Glass Steagall Act of 1933. The latter bill had separated commercial banking activities from investment banking activities. The GBLA also revoked the 1956 Bank Holding Act which restricted affiliation of banks with insurance companies. In short, the GLBA allows for broad banking, where by banks and other financial institutions are able to establish 'financial holding companies' that can conduct merchant banking, underwrite securities and insurance. Thus in addition to the provision of their traditional services, banks may now indulge in other activities that in the past were only restricted to Non-Bank Financial Institutions (NBFIs). GLBA therefore, supplemented other laws like the Riegle-Neal Act of 1994 in bringing about a new wave of universal type financial institutions offering a variety of financial services all under one roof. The Gramm- Leach Bliley Act brought about a complete overhaul of

the nature of banks and financial institutions at large in the U.S., giving rise to giant global financial institutions with different levels of diversification and profitability than ordinary banks. In fact the Act brought about a complete face-lift of the structure and performance of American banks in general.

In spite of the importance of regulation and supervisory frameworks in the operations of financial institutions and banks, very little empirical research exists that investigates the relationship between bank supervisory establishments and bank performance. My search for literature review turned up only a few pieces of research specifically on African countries. In fact, there is a general scarcity of literature on factors affecting bank performance in Africa, which Olugbenga and Olankule described as:

> While there have been very many studies aimed at isolating the characteristics, behavior and performance determinants of banks in developed countries, there are very few that focus on developing countries of Africa....(Olugbenga and Olankule 1998, 3)

Thus there is a need to carryout research on African countries to accommodate unique characteristics of financial sectors that may be absent from their counter parties in developing and less developed countries elsewhere. A reliance on findings derived from non-African countries might be misleading or prove irrelevant to Africa, if fundamental attributes that characterize African countries have been omitted. This research will therefore show if banks in African countries have a tendency to respond differently than banks in other countries to factors that are commonly believed to be determinants of bank performance.

Olugbenga and Olankule (1998)[4] investigated the relationship between bank performance and supervision in Nigeria. They attempted to demonstrate how the policy of financial deregulation affected the quality of management and efficiency of Nigerian banks using the Data Envelopment Analysis Method (DEA)[5]. An intertemporal comparison of changes in efficiency as well as the relative inefficiency of government controlled banks with private banks for the period from 1983 to 1993 was made. A sample of 55 banks, 20 of which operated before the structural Adjustment Program (SAP) leading to the deregulation of the financial sector and 35 which operated after deregulation, was considered. It was concluded that there were indications that the efficiency of banks in Nigeria seemed to decline noticeably with deregulation, however, the result could also be possibly attributed to inconsistent policies affecting the financial sector during the period of SAP.

Satta (2000) undertook a study of the Tanzanian financial sector. He ran a regression to test the hypothesis; 'increased compliance costs lead to reduced financial system efficiency', and he concluded that compliance costs to regulation have a negative relationship with bank earnings. He cited the following as contributories to limited income generating opportunities for banks in Tanzania: the restriction of regional bank expansion to other regions, the legal limits on lending to various sectors and interest lost on insurance deposit fund contributions, suspension of some services by banks in order to

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[4] They justified their research entitled, "Bank Performance and Supervision in Nigeria: Analyzing the Transition to a Deregulated Economy (March 1998) on the basis that "The increasingly complex nature of the banking system and the need to enhance the effectiveness of monetary policy and ban supervision in Nigeria make the study a desirable one."

[5] See Siems and Yue (1992) for the understanding of the DEA method.

meet deadlines for submission of statutory reports, interest lost on minimum required reserves and time plus money lost on collating data from various units of banks to consolidate reports. However, he only found that roughly 3% of the bank earnings variation in the country could be blamed on regulation and supervision compliance costs.

Generally, it appears that very few studies have been aimed at the effects of bank supervision frameworks on bank performance for any other country, regardless of the level of development or geographic location. Taylor and Quintyn (2002) indicated that only a relatively small amount of research has been conducted on regulatory and supervisory independence, whereas inappropriate supervisory practices have proven to be the principal cause of recent banking crises. Mitchener observed that even the reliability of a few studies that exist in the area of the influence of bank supervision on bank performance, is questionable.

> Empirical research aimed at analyzing the relationship between supervision, regulation and financial stability has faced significant challenges, including insufficient identifying variation to test competing hypothesis. (Mitchener 2003, 1)

To further reinforce the lack of appropriate research to evaluate the impact of supervision on the performance of banks, Mitchener questioned the significance of contributions of cross-sectional studies from developed countries in that they lacked comprehensive supervisory and regulatory data. To drive his point home, he gives an example of the World Bank Study by Demirguc-Kunt and Detragianche (1999) which uses indirect measures like the rule of law and the quality of bureaucracy as a proxy for the quality of the supervisory regime. Therefore there is a need to do more research in the relationship between bank supervision and bank performance, while at the same time

improving on the methodology used in existing studies, in order to improve the accuracy of obtained results.

In their study referred to earlier, Barth et al. (2002) observed the fact that the subject of cross-country structure, scope and independence of banking supervision was under researched. Ordinary Least Squares (OLS) techniques were applied to a cross-country model of a 55 global counties including a few African countries, some of which are part of the sample of this study. Barth et al (2000) noted an impact of the structure of supervisory mechanism on bank performance, whereby a single supervisory authority had a strong positive effect on bank performance, while the participation of the central bank in supervision, only had a weak impact. The independence and scope of bank supervisor variables were insignificant. The retesting of the model using alternative data sources failed to replicate the results obtained initially.

Mitchener (2003) studied country level data on bank suspensions from 1929 to 1933 to determine the extent to which differences in financial regulation and supervision across states accounted for the significant regional variation in bank suspensions. The aim was to use banking crises during the Great Depression as a step forward towards the clarification of theory and policy issues regarding the impact of bank supervision and regulation on financial stability. He concluded that differences in state regulatory and supervisory practices helped to explain regional variation in financial distress during the Depression. The results also showed that the tougher the capital requirements, the lower the suspension rates of state-chartered commercial banks. Furthermore, the more prohibitive the branching laws and the higher the reserve requirements, the greater the instability in banking. In general Mitchener concluded that, even though they may be

difficult to put into practice, good supervisory techniques have the potential to enhance the stability of the banking industry:

> Arming nations with 'best-practice' supervisory and regulatory policies, such as the Basel Committee's 'Core Principles for Effective Banking Supervision' can potentially improve the stability of the international banking system; but the experience of the U.S. during the Depression also shows that implementing such practices may be difficult. (Mitchener 2003, 27)

It is clear from the few cited studies on the relationship between bank supervision and bank performance that to a certain extent, the monitoring and controlling of bank behavior influence the profitability of banks.

This study will adopt variables and the methodology from previous studies in running regressions to determine the effect of supervision on the performance of banks. In particular, variables of the structure, scope and independence of the bank supervisory framework will be adopted from Barth et al. (2002). Ten models will be run on each of the four indicators of bank performance which include the ratio of before tax profits to total assets, the return on assets, the return on equity and the net interest margin. Thus, the purpose of this chapter was to set up the methodology of the study to be discussed in the next chapter.

CHAPTER 3

METHODOLOGY AND HYPOTHESES

3.1 Introduction

This chapter constitutes the important parts of the study, as it details the method through which the tests of the study will be conducted, and concludes by discussing the hypotheses to be tested.

Sub-Sections 3.2 to 3.7 form the methodology part which introduces the model used in the study, the test equation and fully explains all variables, providing details on how they were computed, their relevance to the study and the expected signs of their coefficients.

The discussion of the hypotheses follows, including a brief explanation of the exact variables to be used in testing every single hypothesis. Finally, the ten specifications of the forty models to be tested in the study are presented.

3.2 The Model

The basic model is to regress bank profits and the net interest margin on a series of explanatory variables using Ordinary Least Squares. Initially, following Demirguc-

Kunt and Huizinga (1999) variables capturing individual bank characteristics, macroeconomic and the financial market structure attributes of countries in which considered banks operate will be included in models to be tested. The purpose of these variables is to control for the part of bank performance attributed to other factors, even though the aim is to study the impact of supervisory variables. Thus these variables will serve the purpose of isolating the effect of different characteristics of the bank supervisory framework on profits and the net interest margin of banks.

The second step will be to extend the Demirguc-Kunt and Huizinga (1999) model to include variables that represent characteristics of the bank supervisory authorities and regulatory variables, based on the model used by Barth et al. (2002). The additional explanatory variables would answer the question of how the bank supervisory framework affects bank performance in Botswana, based on a sample of African countries.

Where possible, control variables included in the Barth model have been incorporated, although due to data unavailability a few variables differ. However, some distinct variations to the Barth et al. (2002) model have been introduced and they are as follows:

i. Indices ranging from 1-4 used to represent some regulatory variables have been replaced with dummy variables because these variables were all derived from ordinal information.

ii. Four as opposed to one measure of bank performance have been used to establish the robustness of the results rather than using secondary data.

iii. A Wald Test[6] is used to test the joint significance of supervisory variables that individually produced insignificant results to establish if jointly those variables were a factor in bank performance.

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[6] See Section 3.7 for details.

iv. The loan loss provisions variable was included to measure the risk of bank loans.

v. Finally, this study is based solely on African countries, rather than a global sample. This would reveal any unique response of African banks to various factors, if it exists, without a possible masking of reactions by banks from some where else.

3.3 The White Heteroscedasticity-Consistent Covariance Matrix Estimator

Given the vast variation in bank size and performance within and across countries, it is inevitable that the presence of heteroscedasticity in the model be assumed. Furthermore, "...the problem of heteroscedasticity is likely to be more common in cross sectional rather than time series data...." (Gujarati 2003, 391)

In order to check if indeed there was a presence of heteroscedasticity in the data, the White Heteroscedasticity test was used, and it showed that heteroscedasticity existed for all models of bank performance, except in a majority of models for the return on equity as shown in Table 3.1 below derived from the 'eveiws' test output.

Table 3.1 Results of the White Heteroscedasticity Test

	1	2	3	4	5
Before Tax Profits/Total Assets Observations*R^2	**41.071**	**41.317**	**40.977**	**41.363**	**41.424**
Decision	**Accept***	**Accept***	**Accept***	**Accept***	**Accept***
Return on Assets Observations*R^2	41.762	42.074	41.622	42.141	42.245
Decision	Accept*	Accept*	Accept*	Accept*	Accept*
Return on Equity Observations*R^2	38.955	40.297	38.659	40.639	40.861
Decision	**Reject**	**Accept**	**Reject**	**Accept***	**Accept***
Decision	148.479	148.391	147.890	148.578	148.761
	Accept***	Accept***	Accept***	Accept***	Accept***

Table 3.1 Results of the White Heteroscedasticity Test (continued)

	6	7	8	9	10
Before Tax Profits/Total Assets Observations*R^2	**40.977**	**40.966**	**40.966**	**40.977**	**40.966**
Decision	**Accept***	**Accept***	**Accept***	**Accept***	**Accept***
Observations*R^2	41.622	41.589	41.589	41.589	41.589
Decision	Accept*	Accept*	Accept*	Accept*	Accept*
Return on Equity Observations*R^2	38.659	39.285	39.285	38.659	39.285
Decision	**Reject**	**Reject**	**Reject**	**Reject**	**Reject**
Net Interest Margin Observations*R^2	147.890	147.914	147.914	147.890	147.914
Decision	Accept***	Accept***	Accept***	Accept***	Accept***

Notes: Numbers 1, 2 and 3 represent the 10 different models (see Section 3.9 for details) tested for each measure of bank performance. Accept/Reject*, **, *** means significant at the 90%, 95% and 99% levels.

In order to ensure that the model still yields the most efficient coefficient estimates, the White heteroscedasticity-consistent covariance matrix estimator will be used for all models that showed the presence of heteroscedasticity. The later estimator is usually used if the nature of the prevailing heteroscedasticity is unknown.

The following equation represents the computational formula for the White covariance matrix[7]:

$$\text{Est. Asy. Var. (B)} = 1/n(X'X/n)^{-1}\,(1/n\textstyle\sum e_i^2 x_i x_i')\,(X'X/n)^{-1}$$

[7] See (Greene 2003, 199 and 220) from where the equation was adopted for more details on the White estimator.

Where Est. Asy. Var. = Estimated Asymptotic Variance Matrix, b=vector of parameter estimates, e_i^2 = least squares residuals, n = the sample size, X = the matrix of regressors.

3.4 The Test Equation

A linear model relating bank performance ratios to various factors is described below:

$$P_{ij} = \alpha_0 + \alpha_1 B_{ij} + \alpha_2 M_j + \alpha_3 O_j + \alpha_4 R_j + \alpha_5 S_j + \varepsilon_i$$

Where block letters represent different variables, and α_0 is the constant and the rest of αs are coefficients of each of those variables. The subscript $_{ij}$ means bank i in country j, while the subscript j means in country j.

A) P_{ij} is a matrix of dependant variables, which are proxy for bank performance. The data was sourced from IBCA Bankscope database and individual bank websites, and the variables are ratios in percentage from. The first three measures of bank performance are profit measures and the final one is a measure of net interest.

i **BTA**=(before tax profits for bank i in country j)/(total assets).

ii. **ROA** or the return on assets=(income after taxes)/(total assets).

iii. **ROE** or the return on equity=(income after taxes)/(total equity).

iii. **NIM** or the net interest margin=(interest income less interest expenses)/(total assets).

The first three bank measures of performance are measures of bank profits while the last one measures net interest margins.

B) B_{ij}, represents the matrix of bank characteristic variables for bank i in country j. These variables are some of the internal factors that many studies as indicated in the literature review, have proven to be important determinants of bank performance. The B_{ij} variables were sourced from the IBCA Bankscope database (2002) and individual commercial bank websites. The significance of all bank specific variables will be established with the use of 'a one tail t-test' since their impact is either expected to be positive or negative without any ambiguity as will be explained for each of the bank specific variable. All of the variables are ratios in percent and include the following:

i. **ETA**=(equity)/(total assets). It indicates the degree of bank capitalization, thus the extent to which the bank relies on internal rather than external funding. Equity includes share capital, share premiums and reserves, which together form the share holders' funds. It is expected that well capitalized banks should reduce their cost of funding by substituting cheaper internal funding for external funding that is likely to be more costly. Furthermore, bankruptcy costs of a more capitalized bank are much lower, therefore bank creditors will charge lesser interest on the funds they lend to a bank. The two facts lead to the expectation of a positive sign on ETA.

ii. **LNTA**, the log of total assets symbolizes the size of a bank and the extent to which economies of scales can be realized. Larger banks tend to benefit from the theory of 'too big to fail' therefore creditors face a reduced threat level regarding bank failure and loss of their funds. Therefore, banks will be able to acquire investor funding at cheaper interest rates, leading to reduced costs of bank credit. Therefore, LNTA is expected to enhance bank performance, and take a positive sign.

iii. **LPTL**=(loan loss provisions)/(total loans). The variable is used to indicate the degree of loan risk. Even though the level of provisions may just be a regulatory compliance, higher provisions will be assumed to imply elevated chances of bad debts or repayment default. As such LPTL is expected to have a negative sign.

iv. **NIETA**=(Non-interest earning assets)/(total assets) representing the proportion of assets not directly used in the generation of income. This type of assets is expected to impose an opportunity cost on banks in terms of forgone revenue generating possibilities. Thus NIETA is expected to depress bank performance, hence take a negative sign.

v. **OHTA**=(Overheads)/(total assets). The variable measures the non interest or tax costs incurred by banks indicating to some degree, the cost efficiency of banks' operations. If a bank runs at a higher cost it may indicate the amount of funding put into providing a more efficient service for bank customers, hence paving a way to improved performance.

However, in this study higher overhead would be assumed to reflect inefficiency in the use of resources that leads to poor bank performance. OHTA is expected to have a negative sign.

vi. **TLTA** which is (total loans)/(total deposits) expresses the value of loans as a proportion of total bank assets. Loans are assumed to be a major income generating activity for banks, while other bank assets are the source of funds financing those loans. Therefore, the more loanable reserves are transformed into loans, the better the expected bank performance. TLTA will be positive.

vii. **TRATE**=(taxes paid)/pre tax profits) indicating the extent to which taxes eat away from a bank's gross profits. If taxes were a pure profit tax then they would not be expected to hurt bank returns. However, the tax rate normally depends on gross income not on profits, hence it has some distorting effects on bank returns. In this case the coefficient of TRATE is expected to be negative.

C) M_j is the matrix of macroeconomic variables for country j. This is another group of control variables which act as external indicators of bank performance. These variables are meant to give an indication of the level of economic development of the country, which in turn is a proxy for the degree of financial development. These variables are in percentage form and are sourced from the World Development Indicators (2002) and the International Financial Statistics (2002).

The significance of the following variables will be tested by using 'one tail-t tests':

i. **GDPG,** the annual growth rate of GDP is a proxy for the level of economic and financial market development in the country. A more developed financial sector is assumed to have the right technological advancement and managerial skills that are conducive to bank performance. GDPG is therefore expected to be positive.

ii. **GNIP** or the gross national income per capita also symbolizes the level of development. It is expected that in more developed economies the need for credit to finance a wider range of consumer and investment goods, will lead to a higher demand for bank services. This is in turn expected to favor bank performance, so that GNIP will take a positive sign.

iii. **INF** is the annual inflation based on the GDP deflator. The higher the inflation rate the higher the lending rates faced by bank borrowers, therefore the higher interest revenue for banks. This is because banks are expected to raise lending rates by more than the rise in deposit rates, as the general level of interest rates increases with the inflation rate. Thus the rise in costs of credit to the bank prompts banks to raise lending rates by more than deposit rates so as to remain profitable. Therefore profits and the net interest margin are expected to rise in favor of bank performance. INF will therefore, assume a positive sign.

D) O_j is the matrix of other control variables for country j. The 5-bank asset ratio and foreign ownership of bank assets indicate the structure of the banking industry. The other two variables indicate the size or importance of bank lending in the economy. All variables are in percentage form and their significance will be established with the 'one tail t-test':

i. **CONC**, the proportion of bank assets belonging to the 5 largest banks in a country indicates the degree of market concentration implying the extent to which banks can conduct a monopolistic behavior. It is expected that in highly concentrated banking markets, the possible collusion amongst the few dominant banks should allow them a sluggish response in their lending rates as the central bank lowers the bank rate. Also, banks may tend to respond slowly in lowering the cost of loans to their customers in the face of falling inflation because of a lack of competition in the banking market. CONC is therefore expected to enhance bank performance and take a positive sign. Data for the concentration variable was sourced from the Bank Regulation and Supervision database (1999 and 2003).

ii. **FOBA**=(foreign owned bank assets)/(total assets of all banks). To a certain extent, the foreign as opposed to local ownership or control of banks indicates the level of technological advancement and the expertise possessed by bank management. Foreign banks are expected to have a technological and managerial advantage over domestic banks, especially in developing countries as they bring advanced skills and knowledge from industrialized countries. Therefore the higher the value of FOBA, the more

competitive a bank is expected to be, hence the better the performance of banks. Thus the predicted sign on FOBA is positive. Data for this variable was obtained from the IBCA Bankscope database (2002).

iii. **PCBA**=(credit to the private sector by all banks in a country)/(total assets of all banks). The proportion of total banking assets comprising credit to the private sector indicates the demand for bank credit, hence the role banks play in the private credit market as an alternative to other sources of funding. The higher the demand for bank credit, the higher the interest revenue accruing to banks. Therefore, PCBA should take a positive sign. The International Financial Statistics (IFS) (2002) was the source of data for this variable.

iv. **TABGDP**, the ratio of assets of banks to total GDP. This variable shows the importance of banks in the financial markets compared to say the stock market. The higher ratio suggests that banks are a significant player in the financial market and the economy hence the better their performance. That is TABGDP is expected to have a positive sign. This variable was computed based on data from the IFS and the World Development Indicators (2002 and 2003).

E) R_j is the matrix of regulatory variables for country j that govern the behavior of banks and their supervisors. Most of the data used in the construction of these variables were sourced from the Bank Regulation and Supervision database and a

few were from the central bank websites. Section 3.5 shows how dummy variables for the regulatory variables were derived.

F) S_j is the matrix of the structure, scope and independence of the supervisory framework variables for country j. Data used in the derivation of these variables was obtained from the Bank Regulation and Supervision database or from central bank websites. Section 3.5 explains the process used to derive these dummy variables.

3.5 The Derivation of Regulatory and Supervisory Variables

As it was explained in Section 3.2, the regulatory and supervisory variables were adopted from Barth et al. However, the construction of the variables still followed a similar principle but a different approach from that used in the earlier study.

All regulatory and supervisory variables are dummy variables arrived at as follows:

a) Regulatory Variables

The first two variables in this list were constructed as indices in the Barth et al. (2002) study[8], but in this case they are dummy variables s indicated earlier.

[8] The study by Bart et al. (2002) explains the method of construction for these variables.

i. **BNFI,** the restricted participation of banks in commerce. The value of this variable was first obtained by assigning values of 1 if ownership of firms by banks was unrestricted, 2 if it was allowed, 3 if it was restricted and 4 if it was prohibited. The same was done for the ownership of banks by firms. If the average of the two indices was at least 2.5, then a tighter restriction in the cross-ownership between banks and non-financial institutions was assumed. An average of less than 2.5 meant that there was flexibility in the mixing of banking and commerce. Therefore, BNFI took a value of 1 if the mixing of banks and firms was restricted or 0 otherwise.

ii. **BNBFI,** the variable depicting the strict control of the cross ownership between banks and non bank financial institutions was constructed using the same principle as BNFI. Variable, BNBFI=1 if banks and non-bank financial institutions cannot easily own each other, or 0 otherwise.

iii. **DI,** the explicit deposit insurance dummy variable=1 if there is an explicit deposit insurance fund, or 0 otherwise.

iii. **SFD** is the supervisory forbearance discretion dummy variable. A value of 1 was assigned if the supervisor could forbear some of the prudential regulation requirements on banks, or 0 otherwise.

iv. **SUBDEBT** is the dummy variable of the inclusion of subordinated debt in bank capital. If use of subordinated debt is mandatory, SUBDEBT=1, or 0 otherwise.

b) **Supervisory Variables**

i. **BSI** shows the independence of the supervisory authority from political influence. If the bank supervisor was accountable to the president or the minister of finance, dependence was assumed. If the supervisor was accountable to the central bank or any other non-political authority, independence was assumed. Therefore, BSI=1 if the supervisor is independent, or 0 otherwise.

ii. **BSN**, the variable indicating the number of bank supervisors took the value of 1 if there was only one supervisor or 0 if more than one supervisor existed.

iv. **BSS** indicates the scope of bank supervisor. If the supervisor is also responsible for non-bank financial institutions BSS=1, or 0 if it is charge of banks only.

iv. **CBS** takes the value 1 if the central bank is a supervisor or takes part in bank supervision, or 0 otherwise.

Finally,

G) ε_{ij}=error term serving the purpose of explaining the part of bank performance not attributed to any of the considered regressors.

3.6 Expectations of Signs on Regulatory and Supervisory Explanatory Variables

As mentioned earlier, the impact of regulatory and supervisory variables on bank performance may be favorable or detrimental to bank performance. In that light, the coefficients of the regression might either take on negative or positive signs. Since the expected signs of the coefficients of regulatory and supervisory variables are ambiguous, 'two tail t-tests' will be used to test their significance.

a) Regulatory Variables

For BNFI, the dummy variable indicating if banks can own business firms or the latter can own banks, a positive sign implies that if banks and non financial institutions own each other, bank profits will be higher. This is likely to occur if managerial skills employed on business enterprises can be effectively applied to banks or the reverse is true. Also if commerce is doing well while banking is unsuccessful, the profitable business would help finance the operations of the one that is failing. The net result would be a good overall performance for the bank, hence BNFI will be positive. If the sign of BNFI is negative, then the ownership between banks and non-financial institutions can hurt bank profitability. A confusion that might ensue regarding where to concentrate managerial or financial resources between banking and commerce might prove

detrimental to the performance of both lines of businesses. Furthermore, managerial resources used on banking might be inappropriate for commerce or that used on firms may be unsuitable for banks. The contradicting resources might eventually lead to lower returns for the bank, should that happen, BNFI will be negative.

BNBFI, the dummy variable showing the extent to which the combination of banking with operations of non-bank financial institutions is restricted may take a positive or negative sign. If positive, it would imply that the wider the scope of bank activities, the higher the bank's profits. That would follow from the fact that a higher diversification of a bank's activities may provide economies of management and other resources of the bank. Also, allowing the cross-ownership between banks and non-bank financial institutions provides the opportunity for the non-banking aspect of the business to cushion bank losses, if the former business is more profitable than banking. The overall impact can be a boost in bank profits, therefore BNBFI will be positive. On the other hand, BNBFI may assume a negative sign, implying that the wider scope of bank activities lowers the profits of a bank. That is possible since if a bank is highly diversified it may prove difficult for top management to fully monitor all the business lines, giving rise to a possibility of continuing with unprofitable business activities. Furthermore, high profits from well performing sectors may conceal the poor performance of others. The apparent high returns may induce management to relax their monitoring exercises thinking that all their business lines were doing well, eventually leading to poor bank performance. In addition, the senior management of a bank may not have the relevant experience to run NBFIs, resulting in mismanagement problems followed by poor bank performance.

DI, the variable representing the existence of formal deposit insurance may be detrimental to bank performance. The fact that there is a reserve of funds to bail out a bank in case of bankruptcy may discourage banks from vigilantly identifying borrowers who are likely to default on loan payments, hence raising the incidence of bad debts. In this case DI will hurt bank performance and, hence take a negative sign. On the other hand, the presence of deposit insurance might result in lower bankruptcy costs faced by bank creditors, leading them to lend funds to banks at reduced rates, and in the process enhancing bank performance. DI will be positive, in this case.

SFD, a measure of the degree of supervisory forbearance discretion in dealing with problem banks may also be negative or positive. In a bid to establish a good relationship with supervised institutions, the bank supervisor might postpone placing punitive measures on troubled banks. If a bank facing liquidity problems is allowed to continue with its normal course of business that might worsen its financial situation. Supervisory discretion will be detrimental to bank performance, and SFD will take a negative sign. A prudent supervisor might use its discretion to the benefit of bank performance. An isolated incident can make the liquidity position of a bank questionable, yet the situation could be corrected if the bank could carry on with its normal business activities and generate more income. If the supervisor notices this and delays the imposition of any restrictions on the bank, the latter's performance can actually improve. In this scenario, supervisory forbearance discretion will be favorable to bank performance and it will have a positive sign.

SUBDEBT indicates if subordinated debt is required to be part of bank capital. A mandatory use of subordinated debt can induce bank creditors to monitor the soundness

of a bank so as to protect their interests by minimizing the problem of asymmetric information regarding the safety of bank assets. Investors will discipline risky banks with higher interest rates, restrictive debt contracts or they may even stop doing business with them. Banks would then be forced to cut back on their risk and improve their liquidity position, if that happens SUBDEBT will have a positive sign. However, if the market misinterprets the risk level of a bank and penalize even healthy banks, the latter might experience an unwarranted decline in performance. Also market participants may not have the necessary skills to assign the true level of bank risk, hence failing to penalize risky banks. The latter would continue to elevate their risk level since they are not being punished for the risk, a move that may end up hurting their returns. The mandated inclusion of subordinated debt in bank capital would hurt bank profitability and will take a negative sign.

BSN, the variable indicating the existence of only one bank supervisory authority may have a negative or positive sign. A single supervisor might be superior to a multi-tiered supervisory framework due to the possible confusion or complications that may arise regarding who plays what role in the presence of multiple supervisors. Conflict of interests coupled with problems of when and how corrective action should be executed may be another problem. This might cause a delay in identifying banks in distress or in deciding corrective action, possibly leading to poor bank performance. Thus a single supervisor might be in a better position to monitor the soundness of a bank and to order timely corrective measures. That would ensure banks are running efficiently and become more profitable. The coefficient of BSN would be positive. However, a single supervisor might find its resources over stretched, forcing it to conduct less frequent bank

examinations, or taking a long time for problems to be noticed, hence delayed corrective exercises. If that situation arises, banks might become negligent in scrutinizing ventures before undertaking them, running a higher risk of conducting business inefficiently, and become less profitable. This situation is more likely to occur if the supervisory authority is less skilled and less endowed with the necessary resources to conduct effective examinations and to act accordingly. The sign of BSN would be negative.

BSI, a variable of bank supervisor independence can either enhance or erode bank profitability. If the supervisor is free from political influence, a desist order on banks that finance presidential campaigns, for example, can still be done on the election year. If the cease and desist orders cut on activities that led to the bank's financial difficulties, and strengthens its performance, BSI will be positive. However, independence might give the supervisor the liberty to enforce unnecessary orders that might cripple a bank's performance by restricting its scope of operation, knowing that there will not be any government intervention. Doing so can hurt the profitability of a bank, hence BSI will have a negative sign.

BSS, a variable indicating that the duties of a bank supervisory are extended to non-bank financial institutions might have a negative or positive sign. If the bank supervisor is focused on banks and non-bank financial institutions, the supervisor might fail to become more innovative in devising appropriate and efficient supervisory measures for banks, as there would be divided attention and a division of resources. Banks would take advantage of the limited monitoring and opt for more risky investments in an attempt to raise their returns, which might actually hurt their performance. That is, if the supervisory mechanism is not solely bank oriented, there is a

possibility that the impact of supervisor scope might be detrimental to bank performance, hence BSS would take a negative sign. On the contrary, if the extension of bank supervisor responsibilities to cover non-bank financial institutions means the supervisor will learn from the experiences of the latter institutions to become more innovative in their supervisory techniques, resulting in more efficient supervision that might lead to better bank performance. In this case BSS will have a positive sign.

The variable CBS indicates the effect of the central bank participation in bank supervision on bank performance. First, the central bank might be in a better position to be the most efficient supervisor in that it is the licensor of banks, lender of last resort and the overseer of monetary and economic stability in the country. The central bank may have the incentive to supervise prudently so as to protect its interests by ensuring a sound banking system. Careful monitoring and supervision can minimize bank risk and raise bank profitability, and CBS will be positive. On the contrary the central bank may not have the necessary expertise or enough manpower to conduct bank supervisory duties. This is likely to happen if in pursuit of its other objectives, the central bank only has limited resources to devote to bank supervision. Also, in the attempt to achieve its other goals, for example targeting inflation, the central bank might raise the required reserves to constrain funds available to support bank credit. This would in turn limit banks' loanable funds, denying them the opportunity to generate interest income, and thus retarding their profitability. CBS will take a negative sign.

3.7 Establishing the Joint Significance of the Supervisory Variables

The tests of joint significance are conducted to establish if supervisory variables that will individually test insignificant will also produce insignificant results if tested jointly. If they did, then the joint significance test would have ascertained that indeed those variables do not matter for bank performance. However, if the joint significance tests are significant, a conclusion would be made that the joint impact of variables on profits and the net interest margin of banks matters.

According to Greene (2003, 320) in the presence heteroscedasticity, the ordinary F-Test which assumes homoscedasticity can not be used to test the joint significance of regressors, because the test is only useable in the case of homoscedasticity. However, the Wald Test is applicable in cases of either homoscedasticity or heteroscedasticity, and it will be used to test the hypothesis that coefficients of all supervisory variables that individually tested insignificant all have a value of zero.

The null hypothesis to be tested is:

$$\mathbf{Ho: } X_i = \ldots X_n = 0$$

Where X represents any supervisory variables that produced insignificant results when tested individually.

The Wald test calculates the test statistic of the unrestricted regression including all explanatory variables even the ones that the null hypothesis assumes to be zero. The test statistic measures how close the coefficients under question are close to zero as the

restricted regression suggests. For the null hypothesis to be true, the unrestricted estimates should approximate zero in value.

The Wald statistic is obtained through the following equation:

$$W = (Rb)'((\text{Est. Asy. Var}(b)R')^{-1}$$

Where b = the unrestricted parameter estimates, Est. Asy. Var(b) = the White heteroscedasticity consistent estimator, R = the following matrix:

$$\begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$

The Wald statistic is asymptotically distributed as χ^2 (q)[9] where q = the number of restrictions made in the null hypothesis.

3.8 Hypothesis

Two sets of hypotheses will be tested. The first set includes four primary hypotheses which propose that the framework of bank supervision matters for bank performance. The first pair of statements refers to the structure of the supervisory framework in terms of its composition and number of authorities conducting bank supervision, while the third and fourth statements have to do with the independence and scope of the supervisor.

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[9] See (Gujarati 2003, 890)for details on the χ^2 distribution

a) **Hypothesis 1**
CBS, the participation of the central bank in bank supervision enhances bank profits and the net interest margin.

Hypothesis 2
BSN, the existence of a single bank supervisor is favorable to the profitability and interest margins of banks.

Hypothesis 3
BSI, the independence of the bank supervisory authority from political pressure raises bank profits and the net interest margin.

Hypothesis 4
BSS, the extension of the responsibility of a bank supervisor to non-bank financial institutions hurts the profitability and interest rate the net interest margin of banks.

The four hypotheses would be tested by including variables capturing the nature of the supervisory framework in the Ordinary Least Squares (OLS) regression models discussed in Section 3.3. The first hypothesis assumes that it is helpful for bank performance to have the central bank being a supervisor or taking part in bank supervision. The second hypothesis proposes that if banks are supervised by only one rather than a multiple of authorities, their returns will be higher. Hypothesis three states that a supervisor which is not accountable to any political authorities improves bank performance. Finally, a supervisor which is in charge of banks and non-bank financial institutions is detrimental to profits and the net interest margin of banks. Significant coefficients for supervisory variables would imply that the structure, independence and scope of supervision matter for bank profitability and the net interest margin. Positive coefficients would mean that supervision is good for bank performance while negative ones would imply a detrimental relationship.

The last set comprises secondary hypotheses that suggest that regulatory variables have a profound influence on the performance of banks.

b) **Hypothesis 5**
The presence of an explicit deposit insurance scheme (DI) increases bank profits and the net interest margin.

Hypothesis 6
A tighter restriction on the cross ownership between banks and business enterprises (**BNFI**) is detrimental to the profits and the net interest margin of banks.

Hypothesis 7
A tighter restriction in the mix between banking and non-bank financial business (**BNBFI**) hurts bank profits and the net interest margin.

Hypothesis 8
The use of mandated subordinated debt in bank capital (**SFD**) favors profits and the net interest margin of banks.

Hypothesis 9
Allowing the bank supervisor permission to forbear some prudential bank regulations (**SUBDEBT**) is good for bank profits and the net interest margin.

The secondary hypotheses would also be tested by including variables that capture the degree of prohibitions that regulations impose on banks and their supervisors in the Ordinary Least Squares (OLS) regression model to be tested. Four regulatory variables on banks will be considered: First; the existence of a formal deposit insurance fund. Second; the variable that shows the level of restriction on the ownership between banks and non-financial businesses or commerce; Third; the variable that indicates the restriction of ownership between banks and non-bank financial institutions, and finally a variable indicating if it is mandatory for banks to include subordinated debt in their capital. Also a regulatory variable pertaining to bank supervisors will be included to show if the supervisory authority has some discretionary powers to forbear prudential regulatory requirements. This indicates if the supervisory authority of banks is allowed to disregard some of the prudential regulation requirements when assessing the risk of a

bank. Similarly the statistical significance of coefficients for regulatory variables will indicate that regulation plays a role in bank performance, while the signs of coefficients will indicate the direction of the relationship between regulation and bank performance.

The stability of the banking industry can be sustainable if the public has confidence that their deposits would be payable on demand, a characteristic banks will posses if they are profitable and meet other necessary criteria. A whole range of factors determine bank profitability, therefore in order to distinguish the impact of bank regulation and supervision mechanism on bank performance, the effect of other variables influencing bank performance need to be isolated. This necessitates the inclusion of other relevant control variables in the model to be tested. OLS regressions would be used on an African cross-country data set to establish the relationship between measures of bank performance and explanatory variables that capture: bank characteristics, macroeconomic conditions, market structure and variables capturing the regulatory and supervisory framework.

3.9 Specifications of Models to be Tested

Based on the following equation, 10 models will be tested for each of the four bank performance measures resulting in an overall testing of 40 models:

$$P_{ij} = \alpha_0 + \alpha_1 B_{ij} + \alpha_2 M_j + \alpha_3 O_j + \alpha_4 R_j + \alpha_5 S_j + \varepsilon_i$$

As explained earlier the "B_{ij}s, M_j s, O_js and R_js" are control variables used to isolate the impact of the four bank supervisory framework variables on bank performance. All the tested models will include the same control variables, hence will form the base model and one or more supervisory variables will be added resulting in the following 10 specifications:

Specification 1: The variable of a single supervisor BSN, is included with control variables.

Specification 2: The variable of the participation of the central bank in bank supervision CBS, is incorporated in to the model.

Specification3: Both BSN and CBS are added to the base model.

Specification 4: Only the supervisory variable indicating that the scope of a bank supervisor BSS, is extended to non-bank financial institutions is added to the base model.

Specification 5: Only the variable of supervisor independence from political Pressure BSI, is added to the base model.

Specification 6: BSN and the interactive term CBS*BSN are added to the base model.

Specification 7: All supervisory variables of BSN, BSI, BSS and CBS are added to the base model.

Specification 8: BSI, BSS, BSS and CBS*BSN are included in the base model.

Specification 9: CBS and CBS*BSN are added to the base model.

Specification 10: CBS, BSI and BSO and CBS*BSN are included in the base model.

CHAPTER 4

THE DATA

4.1 The Sample

The sample is based on 17 countries of different sizes and political structures, and varying levels of economic and financial development from various parts of Africa. Table 4.1 indicates the part of Africa where countries are located.

Table 4.1 Location of Countries in Africa

South	North	East	West	Sub-Saharan
Botswana	Egypt	Kenya	Ghana	Botswana
Lesotho	Morocco	Tanzania	Nigeria	Ghana
Malawi	Tunisia		Senegal	Kenya
Mauritius				Lesotho
Namibia				Malawi
South Africa				Mauritius
Swaziland				Namibia
Zambia				Nigeria
Zimbabwe				Senegal
				South Africa
				Swaziland
				Tanzania
				Zambia
				Zimbabwe

Source: http://www.worldbank.org/data/countryclass/countryclass.html

Even though all countries included in the study are in the category of less developed countries, the diversity of the countries is also embodied in the fact that they also fall into different income groups, as shown in Table 4.2.

Table 4.2 The Classification of Countries by Income Levels

Low	Lower-Middle	Upper Middle
Ghana	Egypt	Botswana
Kenya	Morocco	Mauritius
Lesotho	Namibia	
Nigeria	South Africa	
Malawi	Swaziland	
Tanzania	Tunisia	
Senegal		
Zambia		
Zimbabwe		

Source: http://www.worldbank.org/data/countryclass/countryclass.html

The groups are divided according to the 2003 Gross National Income per capita calculated using the World Bank Atlas Method[10]. The groups are: low income: $765 or less, lower middle income:$766-$3,035, upper middle income-$3,036-$9,385 and high income: $9,386 or more. Most countries fall in the low income level group, representing the fact that most African countries are still struggling with underdevelopment. Only Botswana and Mauritius belong to the upper middle income group, a rare occurrence in the Africa.

[10] See the following website for the explanation of the World Bank Atlas Method: http://www.worldbank.org/data/aboutdata/working-meth.html#World_Bank_Atlas_method

A total of 158 banks are included in the study and the number of banks per country was solely dependent on the availability of data. For the purposes of this study banks have been defined as. "...all institutions that have liabilities in the form of deposits transferable by check or otherwise usable in making payments .... (Beck et al. 1999, 4)

Table 4.3 indicates the number of banks covered per country. Nigeria and South Africa which have the highest number of banks also happened to be the countries with the most number of banks in the sample. For Botswana, Lesotho and Swaziland all the banks present in the country at the end of 2002 were included.

Table 4.3 Number of Banks Sampled per Country

Country	Number Of Banks Included In The Study
Botswana	4
Egypt	16
Ghana	6
Kenya	10
Lesotho	3
Malawi	7
Mauritius	10
Morocco	7
Namibia	4
Nigeria	23
Senegal	4
South Africa	20
Swaziland	3
Tanzania	15
Tunisia	6
Zambia	7
Zimbabwe	13

4.2 Types of Data Used in the Study

The study uses two types of data for the year 2002 pertaining to individual bank and county specific attributes discussed below.

a) Bank Level Data

The first type of data used in the study is the bank specific data which captures the characteristics of individual banks as reflected in their balance sheets and income statements. The variables are shown in Table 4.4.

Table 4.4 Average Individual Bank Characteristic Indicators

	Equity/ Total Assets	Log of Total Assets	Loan Provisions/ Total Loans	Non Interest Earning Assets/ Total Assets	Over Heads/ Total Assets	Total Loans/ Total Assets	Tax Rate
BOTSWANA	7.06	13.00	0.57	10.66	6.18	55.65	14.31
EGYPT	5.78	14.74	2.29	11.07	1.02	48.98	18.94
GHANA	11.97	11.79	4.37	8.96	6.65	40.13	29.28
KENYA	16.42	11.97	5.40	15.63	7.02	50.07	7.74
LESOTHO	8.77	11.49	3.10	18.58	6.17	15.47	34.12
MALAWI	15.09	10.57	3.68	7.05	10.97	30.56	25.39
MAURITIUS	11.31	12.47	3.31	4.25	2.38	46.63	2.45
MOROCCO	7.98	12.17	2.88	11.47	3.85	61.65	52.29
NAMIBIA	9.09	12.92	0.32	4.75	5.64	75.92	29.60
NIGERIA	13.51	11.83	9.62	45.18	7.32	30.64	23.98
SENEGAL	13.26	11.69	1.91	4.64	4.19	88.29	23.21
SOUTH AFRICA	17.30	13.35	3.97	7.71	8.17	59.90	21.07
SWAZILAND	7.87	11.38	0.14	6.47	6.15	58.45	26.14
TANZANIA	14.95	10.43	1.76	13.17	5.78	35.39	8.66
TUNISIA	14.95	15.02	3.05	4.75	3.04	69.94	12.77
ZAMBIA	11.90	11.45	-0.31	17.59	8.44	18.78	27.88
ZIMBABWE	10.05	13.58	2.69	16.40	10.29	36.72	37.79

Sources: IBCA-Bankscope Data Base and individual bank websites.

This group of data is important in that it provides a picture of internal characteristics of each and every bank, which together with other factors have an influence on bank profits and spreads. Expect for the log of total assets, all variables in are in percentage form. The variables reveal the different operational systems, managerial skills and other features of banks in each country. The ratio of equity to total assets ranges from an average of 5.78% in Egypt to 17.30% in South Africa, suggesting that Egyptian banks are more leveraged than South African banks. Also, the average ratio of non interest earning assets to total assets is very high in Nigeria at 45.18%, but much lower in Mauritius at 4.25%. A few banks had tax rates exceeding 100%, but for this study the tax rate was capped at 100%. Mauritius has a very low average tax rate of 2.25% in contrast with Morocco's average of 52.29%, which might be a reflection of different tax policies in the two countries. The cost efficiency of banks across different countries also differs substantially, with the ratio of overheads to total assets averaging 1.20% in Egypt but exceeding 10% in both Malawi and Zimbabwe. Kenya's loan loss provisions averaged 5.4% which the 'Fitch 2003: Kenya Bank Review Outlook' explained on the basis of the relative improvement in the ability of banks to evaluate risky assets. In fact the comparatively lower provisions for losses in Botswana, Namibia and Swaziland are probably indicative of the success of bank managers in avoiding the adverse-selection problem, and hence end up lending mostly to credit worthy borrowers. On the other hand, the high provisioning for loans in Nigeria might be due to a higher rate of non-performing loans. However, it might also be a matter of compliance with the prudential provisioning requirements as dictated by banking regulations.

Table 4.5 presents average ratios of the four bank performance measures which will form the dependent variables in all models to be tested.

Table 4.5 Average Percentage Ratios of: Pretax Profits to Total Assets, Net Interest Margin to Total Assets, After Tax Income to Total Assets and Net Income to Total Equity

Country Name	Before Tax Profits/Assets	Net Interest Margin	Return on Assets	Return on Equity
BOTSWANA	5.04	6.18	4.31	65.44
EGYPT	0.41	1.02	0.31	6.16
GHANA	4.29	6.65	2.96	27.73
KENYA	2.59	7.02	1.91	13.66
LESOTHO	3.52	6.17	2.36	25.28
MALAWI	6.18	10.97	4.67	35.21
MAURITIUS	0.97	2.38	0.78	6.26
MOROCCO	0.92	3.85	0.54	15.39
NAMIBIA	4.26	5.64	2.98	34.90
NIGERIA	4.01	7.32	3.02	24.69
SENEGAL	1.56	4.19	0.91	8.62
SOUTH AFRICA	2.55	8.17	1.71	8.57
SWAZILAND	3.74	6.15	2.77	36.10
TANZANIA	0.80	5.78	0.57	7.64
TUNISIA	1.48	3.04	1.34	8.96
ZAMBIA	5.69	8.44	4.27	36.77
ZIMBABWE	12.84	10.29	8.04	74.65

Source: IBCA-Bankscope Data Base 2002 and individual bank websites

Other things equal, higher performance ratios imply that a bank has a greater advantage in operating more efficiently than other banks, resulting in a higher level of profitability. It is interesting to note that Zimbabwe, the country with the highest inflation rate, as it will become apparent in Section 4.3, generally has the highest average measures of profitability and interest rate spreads. Malawi with a high rate of inflation

too, has comparatively high profit measures. The favorable performance measures in the face of soaring inflation which raises the cost of obtaining funds by banks, reflect the ability of banks to widen their interest margins in order to counter the possible downward pressure on their proceeds. Furthermore Egypt, Senegal and Tunisia have lower annual inflation rates and comparatively lower bank performance measures. Demirguc-Kunt and Huizinga (1999) attributed the lower spreads in Egypt to the fact that the predominantly large state owned banks offered credit at highly subsidized rates. Even though the average spread among the Kenyan banks was about 7.00%, it was described as being low by the 'Fitch Ratings: Kenya Banks 2003 Review Outlook' which blamed it on low Treasury bill rates in which banks hold most of their assets.

b) Country Level Data

The second type of data is made up of country specific variables representing the macroeconomic situation, the level of development, market structure and the regulatory and supervisory variables of the banking sector. All these variables have implications on the performance of banks since they can influence the demand of bank products and services, hence the value of financial returns accruing to banks. Table 4.6, provides year end averages of macroeconomic variables in each country. The growth rate of the gross domestic product and inflation are in percent. Zimbabwe had the worst annual rate of change in the Gross Domestic Product GDP, which was actually a fall of 5.58%. This and other economic hardships that have become common in Zimbabwe are a result of the adverse consequences of the massive exercise by the government to repossess land from white farmers and redistribute it to natives who had no experience in wide scale commercial farming. In Tunisia the growth rate of GDP drastically plummeted from an

average of 5.00% since 1977 to only 1.68% in 2002 due the drastic drop in tourism subsequent to the events of September 11 in the U.S. Furthermore, drought and terrorism attacks in Tunisia added to the slowdown in economic growth. The highest GDP growth was recorded in Tanzania, although the country remained among the poorest in the world.

Table 4.6 The Gross Domestic Product (GDP) Growth Rate, the Annual Gross National Income per Capita (GNI per capita) and the Annual Inflation Rate[11]

Country	Growth Rate of Gross Domestic Product	Gross National Income per Capita ($US)	Inflation*
Botswana	3.08	3,010.00	5.52
Egypt	3.00	1,470.00	3.99
Ghana	4.50	270.00	22.82
Kenya	1.03	360.00	8.70
Lesotho	3.80	550.00	9.77
Malawi	1.82	160.00	17.50
Mauritius	4.40	3,591.00	5.10
Morocco	3.19	1,170.00	0.60
Namibia	2.72	1,790.00	9.41
Nigeria	-0.90	300.00	11.61
Senegal	1.10	470.00	2.74
South Africa	2.98	2,500.00	8.55
Swaziland	3.57	1,240.00	10.80
Tanzania	6.32	290.00	4.19
Tunisia	1.68	1,990.00	2.28
Zambia	3.30	340.00	19.86
Zimbabwe	-5.58	480.00*	107.51

Source: World Development Indicators 2002.

Note: *GNI per capita for Zimbabwe is for 2001, the latest available figure.

[11] See the following website for definitions of the GDP, GNI per capita and the inflation rate used in this study: ((http://www.worldbank.org/data/working/def7.html))

The seemingly healthy growth was just a reflection of continued donor financial support and the solid macroeconomic policies that are a prerequisite for receiving the monetary aid. The highest GDP growth was recorded in Tanzania, although the country remained among the poorest in the world. The seemingly healthy growth was just a reflection of continued donor financial support and the solid macroeconomic policies that are a prerequisite for receiving the monetary aid.

GNI per capita in Botswana like in Mauritius were much higher than in the rest of the countries. The substantial improvement in the diamond mining sector helped by the increased American demand for Botswana diamonds, brought about massive flows of income into the country in 2002. The surge in government revenue coupled with a moderate population growth supported a high level of revenue in Botswana.

In the low income group, Malawi recorded the lowest GNI per capita of $160, stemming from the fact that the country is one of the poorest in the world. Also, the severe drought that diminished agricultural output and high levels of population growth offset any signs of recovery as financial support from the International Monetary Fund, the World Bank and donor countries poured into the country.

On the inflation front, Zimbabwe tops the list with an annual rate of almost 110% as hyperinflation hit the country, again due to the political and socio-economic problems that saw the Zimbabwean dollar depreciating sharply against the world's major currencies. Morocco managed to keep the inflation rate at below 1.0% because of the country's ability to maintain macroeconomic stability in years prior to 2002. In addition, the Moroccan monetary policy authorities are committed to keeping inflation at par with

that of the Euro-zone in an attempt to retain the competitiveness of Moroccan exports to Europe.

Market structure variables in Table 4.7 are indicators of market concentration and the importance of banks in the financial sector. The ratio of assets held by the five largest banks in the country to total assets of banks was 100% for Botswana, Lesotho, Namibia and Swaziland since those countries each had up to five banks operating by the end of 2002

Table 4.7 Financial Environment Variables in Percent

Country Name	5-bank Assets/ Total bank Assets	Foreign Owned Bank Assets	Private Credit/ Bank Assets	Total Assets of Banks/ GDP
BOTSWANA	100.00	23.50	19.28	20.73
EGYPT	61.80	8.57	54.71	87.13
GHANA	77.60	14.16	11.18	23.79
KENYA	60.00	9.89	21.41	32.46
LESOTHO	100.00	34.36	13.67	24.67
MALAWI	73.30	29.05	4.44	8.93
MAURITIUS	90.80	12.07	58.66	79.37
MOROCCO	66.48	3.09	54.04	73.38
NAMIBIA	100.00	8.35	48.48	53.84
NIGERIA	41.10	28.12	15.71	23.89
SENEGAL	76.20	30.46	19.20	20.91
SOUTH AFRICA	75.20	10.00	73.06	79.16
SWAZILAND	100.00	38.85	14.41	16.16
TANZANIA	60.00	61.11	2.78	4.56
TUNISIA	64.80	4.31	61.25	66.41
ZAMBIA	83.00	65.65	5.98	12.09
ZIMBABWE	77.60	1.79	63.59	97.46

Sources: IBCA-Bankscope Data Base, individual bank websites and the International Financial Statistics 2002 and 2003.

A 1.79% proportion of total bank assets were owned by foreigners in Zimbabwe perhaps as a result of the 35% restriction on foreign ownership in private companies. In contrast, over 60% of Tanzanian and Zambian bank assets were owned by foreigners. The variables indicating the importance of banks in providing credit to the private sector averaged over 70% in South Africa showing that a substantial proportion of bank assets in the country are in the form of private loans. On the other hand, the same ratio for Malawi was only 4.5% while the country had the highest average pre-tax profitability of 24.8%, possibly because the low bank credit rates in the country results from banks opting to invest in more secure and highly profitable ventures. Another variable showing the importance of banks is the ratio of total assets of banks to GDP which reveals that 97% of Zimbabwean GDP in 2002 comprised assets of the banking sector, while only 5% was true for Tanzania. The high ratio of banking assets to GDP in Zimbabwe might be an indication that the financial sector in that country is more developed and banks play an important part in economic development than in Tanzania.

Regulatory dummy variables are presented in Table 4.8 on the following page. This set of variables give an indication of rules that govern the behavior of banks and the supervisory authority. BNFI, the variable that shows the level of restriction on the ownership of banks (or firms) by firms (or banks) equal 1 if banks are restricted from owning or be owned by firms or 0 otherwise. Ten countries place tighter restrictions on the cross-ownership between banks and firms. BNBFI, which indicates the restriction of ownership between banks and non-bank financial institutions, takes the value of 1 if highly restricted and 0 if not. Out of 17 countries in the sample, eight put a strict limit in the involvement of banks in non-bank financial institutions or the reverse.

Explicit deposit insurance funds where by a formal statute stipulates the proportion of deposits that are guaranteed in case of a bank failure have been introduced by many countries as a way of establishing stability and public confidence in the banking system. The deposit insurance dummy takes the value of 1 if the country has explicit deposit insurance or 0 otherwise.

Table 4.8 Regulatory Dummy Variables

Country Name	BNFI	BNBFI	DI	SFD	SUBDEBT
BOTSWANA	0.00	0.00	1.00	0.00	0.00
EGYPT	0.00	0.00	0.00	0.00	0.00
GHANA	1.00	0.00	1.00	0.00	1.00
KENYA	0.00	1.00	1.00	0.00	0.00
LESOTHO	1.00	1.00	1.00	0.00	1.00
MALAWI	1.00	1.00	1.00	1.00	1.00
MAURITIUS	1.00	1.00	0.00	1.00	1.00
MOROCCO	0.00	1.00	1.00	0.00	0.00
NAMIBIA	1.00	0.00	1.00	0.00	1.00
NIGERIA	1.00	0.00	1.00	0.00	1.00
SENEGAL	0.00	0.00	1.00	0.00	0.00
SOUTH AFRICA	0.00	0.00	1.00	0.00	0.00
SWAZILAND	1.00	1.00	1.00	0.00	1.00
TANZANIA	1.00	0.00	0.00	0.00	1.00
TUNISIA	1.00	0.00	1.00	0.00	1.00
ZAMBIA	1.00	1.00	1.00	0.00	1.00
ZIMBABWE	0.00	1.00	1.00	0.00	0.00

Sources: World Bank Database on Bank Regulation and Supervision, 2001 and 2003.
Notes: BNFI=the ownership between banks and firms, BNBFI=ownership between banks and non-bank financial institutions, DI=explicit deposit insurance, SFD=supervisory forbearance discretion and SUBDEBT=the requirement that subordinated debt should be part of bank capital.

Very few African countries have formal deposit insurance schemes and in the sample of this study, only Kenya, Morocco, Nigeria and Tanzania had deposit insurances by the end of 2002. All those insurance schemes were funded by premiums paid by banks operating in each country. On July 1, 2003, Zimbabwe introduced a deposit insurance scheme,

mainly to retain depositors' confidence in the banking system that was already facing liquidity problems. In the same year, the South African Reserve Bank and the Treasury were at an advanced stage of finalizing plans to formulate formal deposit insurance for the country.

SFD, the supervisory forbearance discretion variable equal one if the supervisor has the discretion to forbear some of the prudential bank regulations, or zero otherwise. For most countries bank supervisors have some discretionary powers, hence they can judge each case of a troubled bank on its merits and only impose regulations if it is necessary to do so.

SUBDEDT, a variable indicating if subordinated debt is required as part of bank capital takes the value of one if there is a mandatory use of subordinated debt, but zero if not. Imposing this requirement is an attempt to encourage the use of market discipline to supplement formal bank supervision conducted by the officially appointed authorities. Only Malawi and Mauritius required that bank capital should include subordinated debt. In the rest of the countries, a proportion of bank capital could include subordinated debt if banks wished to do so.

Four supervisory variables dummy variables included in the models are represented in Table 4.9 on the next page. BSI, the variable of supervisor independence from political influence=1 if the supervisor is independent, or 0 if not. Bank supervisors in only four countries were not subjected to political pressure. The number of bank supervisors variable, BSN=1 if there is only one bank supervisor, or 0 if there is more. Only Morocco and Nigeria had more than one supervisor of banks. Regarding the scope of coverage of the bank supervisor, BSS=1 if the bank supervisor also supervises non-

bank financial institutions, and 0 if the responsibility of the supervisor is limited to banks only. In most of the countries the bank supervisor was also in charge of non-bank financial institutions, yet it was also common to have a separate supervisor for insurance businesses

Table 4.9 Supervisory Dummy Variables

Country Name	Supervisor Independence (BSI)	Single Supervisor (BSN)	Supervisor Scope (BSS)	Central Bank Supervises (CBS)
BOTSWANA	0.00	1.00	0.00	1.00
EGYPT	0.00	1.00	0.00	1.00
GHANA	0.00	1.00	1.00	1.00
KENYA	0.00	1.00	1.00	1.00
LESOTHO	0.00	1.00	1.00	1.00
MALAWI	0.00	1.00	1.00	1.00
MAURITIUS	1.00	1.00	1.00	1.00
MOROCCO	1.00	0.00	1.00	1.00
NAMIBIA	0.00	1.00	0.00	1.00
NIGERIA	0.00	0.00	1.00	1.00
SENEGAL	1.00	1.00	1.00	0.00
SOUTH AFRICA	0.00	1.00	0.00	1.00
SWAZILAND	0.00	1.00	1.00	1.00
TANZANIA	0.00	1.00	1.00	1.00
TUNISIA	1.00	1.00	1.00	1.00
ZAMBIA	0.00	1.00	1.00	1.00
ZIMBABWE	0.00	1.00	0.00	1.00

Sources: Central Bank Websites and the World Bank Database on Bank Regulation and Supervision 2001 and 2003.

The variable indicating whether the central bank is part of the bank supervisory authority, CBS=1 if the central bank supervises, and 0 otherwise. Basically for all countries in the sample, the central bank is either the sole supervisor or it is part of the supervisory authorities in existence. However, on technical grounds the bank supervisor

in Senegal is not classified as a central bank because the situation in that country is different from the rest the countries in the sample. For Senegal the central bank in charge is a joint central bank for the Western African Monetary Union comprising eight different countries. Therefore, it is the Central Bank of Western African Countries (*BCEAO* – the French acronym) that supervises banks rather than the traditional single country central bank. Thus even though *BCEAO* carries out the conventional functions of an ordinary central bank, it is structured to meet the needs of multiple rather than only one country. It is this distinguishing factor that resulted in the supervisor in Senegal being classified as having no central bank participation for purposes of this study.

The fact that only two countries have more than one supervisor and only one country has a supervisor that is not classified as a central bank for purposes of this study means that there is not much variability in the data for those variables in the sampled countries. Such a situation may possibly affect the precision of the results if more variation would have produced a different outcome.

4.3 Summary of the Data

This section indicates the minimum, maximum and mean of each of the 23 variables included in the models and also the country with the lowest and highest value by variable. Tabulated data in each of the following sub-sections further reveal the diversity of the 158 banks in the sampled 17 countries.

a) **Bank Performance Variables**

Table 4.10 shows statistics of bank performance measures. The wide ranges in performance measures give an indication of the differences in the size, the diversity or efficiency of operations by different types of banks. Banks included in the sample are not the same, some carryout merchant banking, underwrite securities or include any other type of operations that fall outside the scope of traditional banks. This therefore, might possibly provide most of the explanation regarding the substantial differences in performance and other attributes of individual banks.

Table 4.10 The Minimums, Maximums and Means of Bank Performance Variables

VARIABLE	MINIMUM		MAXIMUM		MEAN
Before Tax/Total Assets	South Africa	-7.67	Zimbabwe	53.82	3.50
Net Interest Margin	Egypt	-0.40	South Africa	74.36	6.23
Return on Assets	South Africa	-8.26	Zimbabwe	34.38	2.46
Return on Equity	South Africa	-77.13	Zimbabwe	127.70	22.62

The lowest ratio of before tax profits to total assets of -7.67% was recorded for a South African bank, blamed on provisions for a disputed tax assessment and on a non-deductible provisions and impairments item.

b) **Bank Characteristic Variables**

Variables presented in Table 4.11 on the next page also show wide ranges in individual bank characteristics which might represent differences in the efficiency of bank operations and management. However, the range might also indicate the difference in accounting standards across countries or even amongst individual banks.

The minimum overheads ratio of 0.09% in Zimbabwe seems suspect, but the bank was included in the study since there was no justification that the figure was incorrect. It may just be due to the way the bank defines its non-interest costs or the manner in which it conducts its business. Finally the low overhead-asset ratio might reflect the uniqueness of the institution in question, the identification of which is beyond the scope of this study.

Table 4.11 The Minimums, Maximums and Means of Bank Characteristic Variables in Percentages

VARIABLE	MINMUM		MAXIMUM		MEAN
Equity/Total Assets	Morocco	0.74	South Africa	88.84	12.37
Log of Total Assets	Tanzania	4.77	Morocco	21.30	12.48
Loan Provisions/ Total Loans	Zambia	-12.84	Nigeria	41.80	3.77
Non Int. Earning Assets /Total Assets	Zimbabwe	0.01	Nigeria	74.53	15.63
Overheads/ Total Assets	Mauritius	0.09	South Africa	55.96	6.56
Total Loans/Total Assets	Egypt	4.66	Senegal	91.58	45.57
Tax Rate	Kenya	-110.50	Egypt	100.00	21.77

Few banks in certain countries, registered tax rates beyond 100%, but for the purposes of this study the tax rate was limited to 100%, borrowing from Barth et al. (2002), to allow for a meaningful comparison of the results from the two studies.

c) Market Structure Variables

Table 4.12 on the next page also shows a great disparity in the variables. The fact that the ratio of total assets of banks to GDP is over 97% in Zimbabwe but only about 5% in Tanzania, shows how small the banking sector is in the latter country in contrast with its size in Zimbabwe. A 100% five-bank asset ratio in Botswana, Lesotho, Namibia and

Swaziland reflects a very high concentration of banking industries in those countries, characterized by only a few banks.

Table 4.12 The Minimums, Maximums and Means of Market Structure Variables in Percentages

VARIABLE	MINIMUM		MAXIMUM		MEAN
5 Bank Assets Ratio	Nigeria	41.10	Botswana Lesotho Namibia Swaziland	100	69.45
Private Credit/Bank Assets	Tanzania	2.78	South Africa	73.06	36.01
Total Assets of Banks/GDP	Tanzania	4.56	Zimbabwe	97.46	48.65

d) Macroeconomic Variables

The big ranges in variables shown in Table 4.13 are purely an indicator of the diverse macroeconomic situations and levels of development in the sampled countries. Low GNI per capita generally results from the reduced ability of countries to generate enough income, a problem exacerbated by high population growth rates in most countries, for example Malawi. On the other hand lower inflation mostly reflects the central banks' commitment as monetary authorities to control inflation, so as to promote exports or to support the domestic economy.

Table 4.13 The Minimums, Maximums and Means of Macro Economic Variables in Percentages

VARIABLE	MINIMUM		MAXIMUM		MEAN
GDP	Zimbabwe	-5.58	Tanzania	6.32	1.95
GNI per capita	Malawi	160.00	Mauritius	3,860.00	1175.35
Inflation	Morocco	0.60	Zimbabwe	107.51	14.76

CHAPTER 5

EMPIRICAL RESULTS

5.1 A General Comment on the Results

The following discussion is derived from Tables A.1A to A.4B in the appendix which present the results of the 10 ordinary least squares regression models on each of the four bank performance measures.

In general, variables included in the models yielded results that supported the hypothesized impact on bank performance. Only three of the 23 variables produced results that contradicted expectations, yet as it will become apparent in the analysis of individual variables, there is still a logical economic explanation to justify the seemingly unexpected outcomes. Overheads were expected to hurt bank profitability assuming high operation costs signaled inefficiency in the use of bank resources. However, higher overheads boosted bank profits, an acceptable result in that increased, costs might be due to more funds being directed into investment in skills and technology leading to better services and increased efficiency in bank operations. A combination of the latter may appeal to bank clients whilst at the same time raising the customer base of the bank, hence widening income generating opportunities. In fact Naceur (2003) and Abreu and Mendes (2002) also obtained a positive relationship between overheads and profits. They

all concluded that part of bank costs were borne by consumers of bank products and services.

Some findings from earlier research either matched or contradicted the results of this study. Nier (2000) based on a study of some European Union member countries, concluded that market concentration enhanced bank profits, in line with the highly positive relationship obtained in this study. However, Barth et al. (2002) on a study of banks in global countries reported negative, though generally insignificant results. Thus some researchers obtained negative while others got positive results regarding the impact of market concentration on bank performance. Keely and Zimmerman (1985) actually found that the relationship between the two can go either direction. In fact Berger (1995) concluded that market concentration can either enhance or retard bank performance in U.S. banks depending on what other factors are in play, and that substantiates Keely and Zimmerman's conclusion. There is therefore, no reason to believe that the results were influenced by the fact that this study was based solely on African countries. Rather the difference in results might be due to the inclusion of differing variables by different researchers which might result in misspecification bias.

Furthermore, it appears that all categories of explanatory variables considered in this study play an important role in determining bank performance. Nevertheless, the extent to which they matter differs across the group of variables or amongst individual regressors. There is also an indication that determinants of profits differ from those of net interest margins since some variables were significant in the profit but insignificant in the net interest margin models, or the reverse was true. The value of provisions for loan losses significantly hampered profitability while it was ineffective on the net interest

margins, while the gross national product per capita depressed interest margins but had no impact on profits. It is worth noting that some variables, especially within the bank-specific group that affect profits significantly will have an insignificant impact on net interest margins because of the way the latter are computed. For example loan loss provisions do not enter in the computation of margins, hence no impact is expected on the latter. However, in order to get profits, loan loss provisions are some of the deductions made from gross income, therefore provisions for losses are expected to affect profit measures.

5.2 Bank-specific variables:

Bank-specific variables were included to control for differences in internal bank characteristics such as size, the degree of capitalization and cost efficiency, all of which are likely to affect bank performance. Table 5.1 reports the results for the 'one-tail' tests of significance conducted on bank-specific variables. The summary of results for profits adopts the most common result obtained for the three measures of profits. It is clear from Table 5.1 that each of the bank characteristic variables produced significant results for at least one measure of bank performance, except for the ratio of total loans to total assets which was always insignificant. Thus bank-specific variables are important in determining bank profits and net interest margins. Naceur (2003) concluded that a considerable amount of differences in interest spreads and net profits on Tunisian banks was explained by characteristics of individual banks. Most of the bank-specific variables

in the Demirguc-Kunt and Huizinga (1999) models were also significant in the interest margins and profit models of banks, globally.

TABLE 5.1. THE SIGN AND SIGNIFICANCE OF BANK-SPECIFIC EXPLANATORY VARIABLES FOR EACH BANK PERFOMANCE MEASURE

Variable	Hypothe-sized Sign	Before Tax Profits/ Total Assets	After Tax Profit/ Total Assets	Net Income/ Equity	Net Interest Margin	Summary of Results for Profits
Equity/total assets, ETA	+	+**	+**	-	+***	+**
Log of total Assets, LNTA	+	+	+	+**	+**	+**
Loan provisions/total assets, LPTL	-	-**	-**	-	+	-**
Non-interest earning assets/ total assets, NIETA	-	-	-	+*	+	-
Overheads/total assets, OHTA	-	+**	+**	+	+*	+**
Total loans/total assets, TLTA	+	+	+	-	-	+
Tax rate, TRATE	-	+mostly insignificant	-	+	+	+mostly insignificant

Note: +***, +**, +* mean positive and significant at the 1%, 5% or 10%. +/- mean positive or negative and insignificant

On the profit side, the ratio of equity to total assets entered all the return on equity equations negatively but insignificantly, whereas the rest of the profit measures produced the expected positive relationship that has been obtained in a number of studies by researchers such as Abreu and Mendes (2002), Barth et al. (2002), Bashir (2000) and Demirguc-Kunt and Huizinga (1999). Even for the net interest margin, the obtained

results were positive as anticipated since the substitution of equity for debt minimizes the insolvency risk, while at the same time reducing the need for costly external funding, causing the profitability of banks to rise.

The size of a bank as captured by the log of total assets was always positive but insignificant for the ratio of before tax profits to total assets and the return on assets. However, the log of total assets consistently produced significant results for the return on equity and net interest margins at the 5% and 10% levels of significance, respectively. That is, bank size boosts performance, consistent with the thinking that bigger banks have a higher chance of benefiting from economies of scale.

Loan loss provisions had no impact on interest margins but were highly detrimental to profits, implying that high provisioning means a substantial instance of bad debts, hence lower profits since provisions for losses are deducted from gross profits.

The ratio of non-interest earning assets to total assets produced insignificant negative results in the before tax profits and the return on assets models but affected the return on equity positively at the 10% significance level. For interest margins, the impact was also positive but always insignificant. This generally insignificant relationship between non-interest earning assets and bank performance was also reported by Naceur (2002) who attributed it to the fact that bank profitability mainly emanated from interest earning assets. On the contrary Barth et al. (2002) and Bashir (2002) obtained highly significant negative relationships between non-interest earning assets and bank profits.

Overheads produced a highly significant positive impact on bank profits and the net interest margin. Even though a negative relationship was expected on profits, higher costs may just be an indication of the amount of funds banks invest in providing the best

quality or quantity of services to their customers which can increase the customer base, and in turn raise the bank's income. Berger et al. affirm the fact that banks can transform higher costs of operations into improved profits if better services attract more customers or allow banks to charge higher fees.

> ...banks have provided additional convenience thorough more extensive branching and ATM networks, expanded availability of debit and credit cards, and a proliferation of online services. It seems likely that providing these new services and improving service quality significantly increased costs, but banks presumably made the necessary expenditures to maximize profits through higher prices or expanding or maintaining market shares. (Berger et al. 2003, 80)

The positive relationship between bank costs and profits may also reflect the extent to which banks are able to shift over their cost burdens to customers. Thus banks with higher operating costs are able to widen their interest rate margins by hiking lending rates or depressing savings rates. Some researchers including Naceur (2002) and Demirguc-Kunt and Huizinga (1999) also reported that overheads boosted bank performance.

Both profits and net interest margins were always unresponsive to the size of bank loans suggesting that revenues from performing loans were offset by losses from bad debts. However, the predominantly positive sign on net interest margins indicates that loans were correctly priced in accordance with the degree of the risk associated with debtors, though revenues failed to increase as well since the effects of nonperforming loans were overwhelming.

The tax rate was negative and mostly insignificant in all bank performance models, thus the tax policy in most of the countries seems to be mainly targeted at pure profits, and hence does not affect bank returns.

5.3 Country Specific Variables

These variables captured the differences in the market structure and macroeconomic environment within which banks in different countries operate, which possibly have influence on bank performance.

a) Market Structure Variables

Table 5.2 shows results of 'one tail t-tests' for market structure variables.

TABLE 5.2. THE SIGN AND SIGNIFICANCE OF MARKET STRUCTURE VARIABLES

Variable	Hypothe-sized Sign	Before tax profits/ total assets	After tax profit/ total assets	Net income/ equity	Net interest margin	Summary of Results For Profits
Market Structure						
5 bank concen-tration, CONC	+	+***	+**	+***	+***	+***
Foreign owned bank assets, FOBA	+	-	-	-mostly insignificant	+	-
Private Sector Credit/bank assets, PCBA	+	-*	-*	-	-	-*
Total assets of banks/ GDP, TABGDP	+	+mostly insignificant	+	-**	+mostly insignificant	+mostly insignificant

Note: +***, +**, +* mean positive and significant at the 1%, 5% or 10%. +/- mean positive or negative and insignificant

In general market structure variables were insignificant, a result that may lead to a conclusion that market structure variables do not influence bank performance. However the fact that some variables produced strong results in cases where they came out significant shows that the structure of the market is also important in bank performance, albeit to a moderate extent. Market concentration in terms of the five bank-asset ratio was positive and highly significant in the profit and the net interest margin models. Some researchers got the same result whilst others reported contradicting conclusions as mentioned earlier on.

The foreign ownership of bank assets variable was insignificant in the profit and net interest margin models. However, significant positive results were expected due to the believe that foreign ownership of domestic banks, especially in less developed countries, should bring about better business skills and technology, leading to better bank performance. Also, preferential treatment that foreign banks are likely to get in terms of tax breaks as a way of enticing them to operate in underdeveloped economies, was expected to reflect in improved bank performance. Barth et al. (2002) and Dermirguc-Kunt and Huizinga (1999) obtained the expected positive results between the performance of banks and the foreign ownership of bank assets.

Credit to the private sector as a proportion of total assets of all banks was detrimental to bank profits at the 10% level of significance, while ineffective on net interest margins. The same unfavorable effect on profit ratios was registered by Demirguc-Kunt and Huizinga (1999) as well, though their denominator was GDP rather than total bank assets. The latter attributed the negative relationship to stiff competition for loans amongst banks which forces them to lower lending rates. Conversely, a positive

relationship was expected since credit is an important source of bank revenues, yet administering numerous small consumer loans, a lot of which may be non-performing or under priced, can easily reverse the relationship. Barth et al. (2002) obtained that expected positive results. The relationship between the proportion of credit to the private sector in total bank assets and the net interest margin was positive, signifying the fact that as the demand for bank credit rises, the laws of demand and supply pushes up lending rates.

As an indicator of the importance of banks in the financial market, the ratio of total assets of banks to GDP was positive and insignificant in the before tax profits, return on assets and net interest margin models. On the contrary, the ratio of total assets of banks to GDP was significantly detrimental to the return on equity. However, a significant positive relationship was expected to represent the fact that the crucial role played by banks in the market was rewarded in terms of better returns as their assets expand. This expectation was met by the results of Naceur (2003) in the net interest margin regressions. Barth et al. (2002) also produced unfavorable results between the value of bank assets as a proportion of GDP and bank profits. This kind of relationship between bank profits and assets may be due to the fact that as bank assets expand, managerial resources become over stretched and monitoring ineffective, leading to poor bank performance.

b) Macroeconomic Variables

Just like in the previous categories of variables, macroeconomic variables have also yielded significant results, indicating that macroeconomic conditions within countries are relevant to bank performance.

Table 5.3 presents a summary of the results for the relationship between macroeconomic and bank performance variables. The annual growth rate of GDP was highly unfavorable to bank profits, a surprising outcome since it was expected that the financial development associated with higher economic development should promote bank performance. Nier (2000) reported significant positive results for the relationship between the growth rate of GDP and profits. Naceur (2003) and Barth et al. (2002) obtained insignificant, though still positive results.

TABLE 5.3. THE SIGN AND SIGNIFICANCE OF MACROECONOMIC EXPLANATORY VARIABLES FOR EACH MEASURE OF BANK PERFOMANCE

Variable	Hypothesized Sign	Before tax Profits/ Total Assets	After tax Profit/ Total Assets	Net Income/ Equity	Net Interest Margin	Summary of Results for Profits
Macro						
GDP growth rate, GDPG	+	-***	-***	-***	+	-
GNI per Capita, GNIP	+	+	+	+mostly insignificant	-**	+mostly insignificant
Inflation, INF	+	+**	+**	+***	+*	+**

Note: +***, +**, +* mean positive and significant at the 1%, 5% or 10%. +/- mean positive or negative and insignificant

Regarding the gross national income per capita, the impact was positive but mostly insignificant in the profit equations, while strongly detrimental to the net interest margin.

Profits and the net interest margin rose with the annual rate of inflation, with the impact much stronger in profit than the net interest margins models. The direction of the relationship was as anticipated in that the higher income level inherent in an inflationary environment if interest rates are flexible, should more than offset the higher costs associated with it, hence fuelling bank performance. Barth et al. (2002), Bashir (2000) and Demirguc-Kunt and Huizinga (1999) also generally found a positive impact of inflation on bank profits. The latter two researchers explained the positive results as arising from the fact that banks may generate higher earnings in an inflationary environment from float due to delays in crediting customer accounts. On the other hand, Abreu and Mendes (2002) reported a strong negative relationship between inflation and profitability. A relationship arising from the fact that the rising costs as inflation escalates outweigh the rise in revenues associated with it, an outcome long established by Wallich (1977) and Petersen (1986).

5.4 Bank Regulatory and Supervisory Variables

As a recap, the inclusion of regulatory and supervisory variables in the models was in an attempt to analyze the impact of different regulatory and supervisory practices on bank performance. A variable of the independence of the supervisory authority (BSI) was included to check if the fact that the supervisor is not accountable to political

authorities matters for bank performance. BSN, the presence of a single supervisor investigated the impact of having one rather than multiple bank supervisors. A variable of extended capacity of bank supervisor to non-bank financial institutions (BSS), tested if the scope of the supervisor matters to bank performance. Finally, the importance of the central bank participation in bank supervision was captured through the variable, CBS.

In addition, the impact of regulatory variables that represent regulations that define actions of banks or supervisors was assessed. The first regulatory variable on banks is the level of restriction on mixing of banking with commerce (BNFI). The second variable of bank regulation shows the extent to which the combination of banking with operations of non-bank financial institutions are restricted (BNBFI). The deposit insurance variable DI, indicate the presence of formal deposit insurance, while SUBDEBT represented mandatory use of subordinated debt in bank capital. Finally the considered regulation on the bank supervisor is allowing the supervisory authority some forbearance discretion (SFD).

a) Bank Regulatory Variables

As revealed in Table 5.4 by the 'two tail t-tests) for regulatory variables mostly produced insignificant results, making this another group of the least effective variables on bank performance.

Even though, the tighter restriction on the ownership between banking and commerce did not affect the other two measures of profitability, it considerably hurt the return on equity and interest margins. The fact that limiting the mix between banking and commerce is detrimental to bank performance is a sign that banks are denied the

opportunity to diverse which could allow them ways to spread their risks beyond the banking businesses. Barth et al. (2002) also reported that a tighter restriction on the mix of banks with commerce was detrimental to bank profits.

TABLE 5.4. THE SIGN AND SIGNIFICANCE OF REGULATORY VARIABLES FOR EACH BANK PERFOMANCE MEASURE

Variable	Hypothe-sized Sign	Before tax Profits/ Total assets	After tax profit/ Total Assets	Net Income/ Equity	Net Interest Margin	Summary of Results For Profits
Bank ownership of/by firms, BNFI	?	-	-	-***	-**	-mostly insignificant
Bank ownership of/by non-bank financial institutions, BNBFI	?	-	-	-	-	-
Deposit insurance, DI	?	-	-	-	-	-
Supervisory forbearance discretion, SFD	?	-	-	-**	-	-mostly insignificant
Subordinated debt required as bank capital, SUDEBT	?	+	+	-	+**	+

Note: +***, +**, +* mean positive and significant at the 1%, 5% or 10%. +/- mean positive or negative and insignificant

The cross ownership between banks and non-bank financial institutions had a negative but insignificant impact on bank performance. In the Bart et al. (2002) model the impact was positive but often insignificant. The lesson from this is that, limiting the

ownership between banks and non-bank financial institutions is apparently not related to bank performance.

The coefficients of the deposit insurance dummy variable were mainly negative and never significant despite the possibility that deposit insurance provides a sense of security to savers who in turn accept lower deposit rates, boosting bank performance. However, Barth et al. (2002) obtained a highly significant detrimental relationship between deposit insurance and the ratio of before tax profits to total assets. Dermirguc-Kunt and Huizinga (1999) concluded that deposit insurance was highly unfavorable to the net interest margin because in the presence of deposit protection banks might become tempted to lend at lower rates, narrowing margins and consequently hurting their profitability. On the other hand, Kaufman and Scott noted a possible undesirable outcome of deposit insurance, in that it can possibly motivate banks to increase their risk.

> If the deposit insurance is under priced, as is not uncommon, it contributes to a moral hazard problem in which bank management is induced to take on greater risk. Second, bank supervisors have strong incentives to delay recognition of insolvencies and payment from their losses. (Kaufman and Scott 2002, 17)

The coefficients of supervisory forbearance discretion variables were negative and insignificant in accordance with the Bart et al. (2002) results, except in the models of the return on equity which still produced negative but significant results. Since only one out of the four measures of bank performance produced significant results, a conclusion can be made that, in general bestowing discretionary powers on bank supervisors does not influence bank performance.

A requirement that subordinated debt be part of bank capital was weakly favorable to net interest margins, while it was negative but insignificant in profit models.

On the contrary Barth et al (2002) obtained a very positive and highly significant relationship between bank profits and subordinated debt. This relationship was attributed to the notion that subordinated debt is a cheaper way to leverage than equity and that relying more on market discipline to supplement official supervision improves bank performance.

b) Bank Supervisory Variables

In addition to all the control variables, each of the four supervisory variables was tested individually and in combination with other supervisory variables, and the results are shown in Table 5.5.

i. The Participation of the Central Bank in Supervision

TABLE 5.5 THE SIGN AND SIGNIFICANCE OF SUPERVISORY VARIABLES FOR EACH BANK PERFOMANCE MEASURE

Variable	Hypo-thesis	Before tax profits/ Total Assets	After tax Profit/ Total Assets	Net income/ Equity	Net Interest Margin	Summary of Results for Profits
Central bank supervises, CBS	?	+mostly insignificant	+***	+***	+***	+***
Single Bank Supervisor, BSN	?	-**	-***	-***	-**	-***
Supervisor Independence, BSI	?	+	+	+	+	+
Supervisor Scope, BSS	?	-	-	-mostly insignificant	-	-

Note: +***, +**, +* mean positive and significant at the 1%, 5% or 10%. +/- mean positive or negative and insignificant

The participation of the central bank in supervision strongly enhanced bank profits and the net interest margin. Thus if the central bank is a bank supervisor, it benefits banks in terms of better performance. Barth et al. (2002) also found a positive but weaker relationship between the central bank being a supervisor and bank profits.

ii. The Existence of a Single Supervisor

The presence of a single supervisor had a very strong detrimental effect on both profits and the net interest margin. On the other hand, Barth et al. (2002) established a highly favorable relationship between the existence of a single supervisor and bank performance.

iii. The Supervisor Independence Variable

The independence of bank supervisor from political influence was ineffective on bank performance. This was also true in the Barth et al. (2002) study. Considering the insignificant effect of supervisor independence for the four measures of bank performance, it is appropriate to conclude that this variable plays no role in the performance of banks.

iv. The Supervisor Scope Variable

Extending the capacity of the bank supervisor to non-banking financial businesses was insignificant, consistent with Barth's findings that the scope of supervisor did not affect bank profits.

c) **The Impact of the Interaction between the Central Bank Participating in Bank Supervision and the Existence of a Single Supervisor**

Finally, an interactive term of the central bank being the only supervisor or (CBS*BSN) was included to investigate the effect of a single supervisor and how the central bank boosts or dampens that impact. Also, the effect of a central bank being a supervisory authority was tested and how if the central bank was a single supervisor altered that effect. The results are shown in Table 5.6 and they indicate that the participation of the central bank in supervision is affected by it being the only supervisor. Also the impact of a single supervisor changes if the central bank is that sole supervisor.

TABLE 5.6. THE SIGN AND SIGNIFICANCE OF THE INTERACTIVE TERM SUPERVISORY VARIABLES FOR EACH BANK PERFOMANCE MEASURE

Impact of (CBS*BSN) if:	Hypothesized Sign	Before tax profits/ total assets	After tax profit/total assets	Net income/ equity	Net interest margin	Summary of Results For Profits
Central bank supervises	?	-**	-**	-**	-**	-**
Single Supervisor	?	+	+*	+**	+*	+**

Note: +***, +**, +* mean positive and significant at the 1%, 5% or 10%. +/- mean positive or negative and insignificant.

i. **The Impact of the Interactive Term on the Relationship Between the Central Bank Participating in Bank Supervision and Bank Performance**

The strong positive impact of the central bank being a supervisor on the performance of banks is affected when it is the sole supervisor. In fact the highly

favorable effect of the central bank being a supervisor on the performance of banks becomes highly unfavorable when the central bank is the only supervisor.

ii. The Impact of the Interactive Term on the Relationship Between a Single Supervisor and Bank Performance

If a single supervisor is also the central bank, the impact of single supervisor on the profitability and the net interest margin of banks becomes positive. This means that the existence of the central bank as a supervisor does not only diminish the negative impact of a single supervisor on bank performance but the effect is completely outweighed. Once again it is clear that both the number of supervisors and the participation of the central bank in supervision matter for bank performance.

5.5 Testing the Joint Significance of Supervisory Variables

The core of this research was to investigate the impact of the independence, scope and structure of bank supervision on the performance of banks. Only the structure in terms of the participation of the central bank in supervision and the number of supervisors generated significant results. It is therefore imperative that the joint significance of the independence and scope variables be tested. This is because concluding that the two variables are individually insignificant does not necessary mean that they are also collectively unrelated to bank performance. Thus joint test is required to reach a conclusion about joint insignificance. The main reason for this is that, the covariance of the tested coefficients may not be zero, and thus the independence and

scope variables may be correlated with each other, hence may collectively produce a significant impact. Gujarati explained this fact by stating that in testing joint hypotheses, each of the individual hypothesis influences each other:

> ...testing a series of single (individual) hypotheses in not equivalent to testing those same hypotheses jointly. The intuitive reason for this is that in a joint test of several hypotheses any single hypotheses is 'affected' by the information in the other hypotheses. (Gujarati 2003, 254)

The joint significance of variables will be tested using the Wald Test which is asymptotically distributed as χ^2 (q) as stated in Chapter 3, Section 3.7.

The tested hypothesis is:

$$\mathbf{H_0: BSI = BSS = 0}$$

The decision rule is based on the rejection of the null hypothesis if the Wald statistic $> \chi^2$ (q) or the acceptance of the null hypothesis if Wald statistic $< \chi^2$ (q).

where q = degrees of freedom or the number of restrictions made in the null hypothesis. From the ^{2} distribution tables χ^2 (2) = 4.60, 5.99 and 9.20, for a 90%, 95% and 99% level of significance.

Table 5.7 presents the test results of the joint significance test.

TABLE 5.7. RESULTS OF THE JOINT SIGNIFICANCE TEST

Dependent Variable	Calculated X^2	Decision		
		90%	95%	99%
Before Tax/Total Assets, BTA	0.980	accept	accept	accept
Return on Assets, ROA	1.450	accept	accept	accept
Return on Equity, ROE	3.160	accept	accept	accept
Net Interest Margins, NIM	1.340	accept	accept	accept

The test for the overall significance shows that the independence and scope of bank supervisor are jointly statistically insignificant. Thus, expanding the responsibilities of the bank supervisor to non-bank financial institutions or protecting the supervisor from political influence does not seem to influence the performance of banks.

5.6 The Economic Significance of Results of The Supervisory Structure Variables

This section aims at determining if the statistically significant results of the structure of supervisory framework variables make sense. This will be done by establishing the magnitude of the impacts of both the participation of the central bank in bank supervision, CBS and the existence of a single supervisor BSN to see if they have any noticeable effect on bank performance.

Table 5.8 indicates the coefficients of CBS and BSN for each of the four measures of bank performance. If a central bank is a bank supervisor or CBS = 1, then: a rise of: 2.8% on the return on assets, 25.5% on the return on equity and 13.0% on the net interest margin will be recorded. Thus a return on assets (ROA) of 1.0% will rise to 2.3%, which is a 2.3% increase. On the other hand the return on equity of 10.0% will rise by 25.5% from 10% to 12.6%. Also, the existence of only one bank supervisor or BSN=1 will lead to the following percentage declines on bank performance variables: 2.3% on (Before Tax Profits/Total Assets), 1.9% on the return on assets, 16.3% on the return on equity and 3.0% on the net interest margins.

The coefficients on bank performance measures suggest that the effects of structure of bank supervisory framework variables are economically substantial, and the net impact depends on the original performance measure of individual banks. Thus the results are not only statistically significant but they are also economically significant.

Table 5.8. The Coefficients of the Variables of the Central Bank Participation in Bank Supervision and the Existence of a Single Bank Supervisor

Variable	Before Tax Profits/ Total Assets, BTA	After Tax Profits/ Total Assets, ROA	Net income/ equity , ROE	Net interest margin NIM
Central bank supervises, CBS	insignificant	2.8%	25.5%	13.0%
single bank supervisor, BSN	-2.3%	-1.9%	-16.3%	-3.0%

CHAPTER 6

SUMMARY, POLICY RECOMMENDATIONS AND FUTURE RESEARCH

6.1 Summary of the Results

The discussion of literature showed that some of the important purposes served by bank supervision are the protection of depositors' interests by limiting the amount of bank risk they may be exposed to, and the establishment of financially sound and stable banking industries. This underpins the necessity of banking supervision especially in Africa and other developing countries which generally have underdeveloped banking and financial systems. In order for these countries to attract investment, there is a need for mechanisms to be put in place to reassure domestic and foreign investors of the safety of their funds. Therefore, governments have normally assumed the role of establishing investor confidence in banking and financial industries through banking supervision conducted by central banks. Once investor confidence is maintained, investment may flourish in a country boosting economic development and growth. It is hence, clear that central banks and bank supervision are important for the good health of entire economies.

Despite this commonly cited reason for the need to establish sound, healthy banking systems culminating in stable financial markets and economic development in favor of bank supervision, very little empirical research has been undertaken to study that relationship. Instead, the relationship between supervision and bank performance is mainly based on perceptions that are not supported by any scientific evidence. Therefore, this study was motivated by a lack of empirical data that explicitly consider the role of different aspects of bank supervisory framework on bank performance for all countries in general.

The main purpose was to use empirical methods to determine the impact of the structure, scope and independence of bank supervision on bank performance in terms of profits and net interest margins. A total of 158 banks were sampled from 17 African countries of different levels of economic and financial sector development. Data for banks of different sizes, efficiency and performance levels were used to test the four principal hypotheses that;(i) the participation of the central bank in bank supervision, the existence of a single supervisor, the independence and scope of the supervisory authority each enhances bank performance.

Borrowing from Barth et al. (2002) variables representing the four aspects of the supervisory framework tested in the hypotheses were considered alongside variables that captured internal characteristics of individual banks, macroeconomic and bank regulatory characteristics of the various countries. All the latter three sets of variables served as control variables to isolate the impact of supervision on bank performance in the Ordinary Least Squares Models used to investigate the kind of influence that supervision has on the profits and net interest margins of banks. As shown in the next section, the

models succeeded in establishing the relationship between all control variables and supervisory variables on bank performance.

All groups of control variables such as bank, macroeconomic and regulatory characteristics were influential on bank performance as per results of the study. Also the framework of bank supervision was shown to have an effect on profits and net interest margins of banks. Furthermore, the overall findings of this report were in line with results of studies which were not based entirely on African countries, therefore there is no reason to believe that banks in Africa responded differently to factors that affect bank performance, than banks from other continents. The study found that the larger the bank equity, the better the performance of banks as cheaper internal funding substitutes for the more expensive external creditor funding, a result that has been obtained in studies of non-African countries.

Even though some variables affected both profits and net interest margins, such as overheads which increased both, it was also revealed that factors that influenced profits are not necessarily the same as those that affect net interest margins. For example, provisions for bad debts were highly detrimental to bank profits, while ineffective on net interest margins. However, the lack of impact of loan loss provisions on interest margins was expected due to accounting principles, because provisions do not enter into the calculation of interest margins as was explained in the previous chapter. Also, the requirement that subordinated debt be included in bank capital was favorable to net interest margins while it did not have any impact on bank profits.

There also exist variables that affected measures of bank profitability differently from each other. Non-interest earning assets and the size of bank assets both had a

slightly significant positive impact on the return to equity but no effect on the ratio of pre-tax profits to total assets and the return on assets.

The bank regulatory variable that limits the extent to which banking can be mixed with commerce was substantially unfavorable to the returns on equity and net interest margins, while the use of mandatory subordinated debt as part of bank capital enhanced net interest margins. On the other hand, the restriction on the cross-ownership between banking and non-banking financial businesses plus formal deposit insurance had no effect on either bank profits or net interest margins. Regarding regulation on the bank supervisor, allowing forbearance discretion was highly unfavorable to the returns on equity, but insignificant in all models of the rest of bank performance measures.

Finally, results yielded by supervisory variables lead to the main conclusions of this research. As indicated earlier the limited variability in the structure of supervisory framework variables that yielded significant results might have influenced the results. However, despite that caveat, the results of this study remain important in that it is the only other study that explicitly considered the impact of bank supervisory frame work on bank performance. Therefore the results of this study can be useful in complementing lessons learned from the study by Barth et al. (2002), given the fact that there are no other studies to gauge the results with.

The study indicates a very strong relationship between the structure of supervision and bank performance. Specifically, there is evidence suggesting that the participation of the central bank in supervision enhances bank performance both in terms of profits and net interest margins. Thus the common practice by the sampled countries of having the central bank as a supervisor of banks is favorable to the profitability of banks. It is

therefore a correct policy choice for the central bank to be the supervisory authority of banks. Furthermore, there is a strong indication that the existence of a single bank supervisor dampens bank performance. Only two of the countries in the study had more than one bank supervisor, hence the majority follow an option that is disadvantageous to bank performance, hence the general health of financial systems.

No apparent relationship between the independence and scope of bank supervisor and bank performance was established. As a way to ascertain that the independence and scope of supervisor indeed had no effect on bank earnings, their significance was jointly tested. The test of joint significance on the two variables, still led to the conclusion that both the independence and scope of the supervisor of banks are unrelated to bank performance.

6.2 Policy Recommendations

The results of the study provides evidence that the nature of the supervisory mechanism put in place in a country along with many other factors has implications on the performance of banks. In Botswana, the Bank of Botswana, which is the central bank, is the supervisor of commercial banks in the country, an appropriate choice towards achieving a sound banking system according to the findings of this study.

The central bank is the sole authority overseeing the supervision of Botswana banks. However, the existence of a single supervisor has been proven to have a negative impact on bank performance, providing a basis to argue in favor of a multi tiered supervisory framework as opposed to the current situation of a single supervisor.

Introducing one more supervisor of banks, can be beneficial in that the central bank is not only the regulator and supervisor of banks, but it is also the monetary authority of the country. There is therefore an inevitable intertwining of all those policies, creating room for bias in cases of conflicting interests. The proposal to introduce an additional bank supervisor is appealing in that, the existence of more than one supervisor can help neutralize any policy bias that may arise in the pursuit of other objectives of the central bank. Also the existence of an alternative supervisor will make more resources available, hence might help to raise the annual number of onsite examinations conducted on each bank. More frequent onsite bank examinations would help the accuracy of risk ratings of supervised institutions. Finally, the alternative supervisory authority may provide a yardstick with which the central bank can gauge its supervisory policy effectiveness or biasness, and thus complement the supervisory duties of the central bank. One important policy recommendation from this study therefore, is to call for the introduction of an alternative regulator and supervisor of banks. However given the fact banks operating in Botswana are relatively small and few in number, the establishment of an additional bank supervisor might prove not to be a cost effective measure, but the proposal is still worth a consideration.

Regarding regulatory variables, imposing tighter restrictions on the integration of banking and commerce is strongly detrimental to net interest margins. This study classified Botswana amongst countries with tighter control on the cross ownership between banking and business firms. The findings of this report therefore, warrant a recommendation for banks to be allowed more flexibility to venture into non-banking activities. Thus there is a need to allow and encourage banks to diversify into non-

banking industries to benefit the profitability and the soundness of the banking and financial markets, as suggested by the results of this study. However, this integration would have inherent complications regarding the regulation and supervision of banks in that it makes them fall outside the scope of traditional banking and necessarily outside the capacity of the supervisory authority of the Bank of Botswana. Therefore there would be an inevitable need to review regulatory and supervisory statutes to prevent any loopholes that might lead to banks evading prudential regulation and supervision, a move that could fail the good health of the financial sector that it was meant to strengthen.

6.3 Future Research

It is important to know if the way a bank supervisory mechanism is set up matters for bank performance, but it also appropriate to know the impact of different types of supervisory and regulatory policies. However, models of this study did not capture specific regulatory tools like the amount of reserves that banks have to hold with the central bank to back deposits. Similarly, the impact of specific supervisory systems like onsite versus offsite monitoring or the frequency of bank examinations was not explored. There is therefore, a need to include variables that depict different types of supervisory policies in models that analyze the relationship between bank supervision and performance.

The sample of the study included any institution that accepted deposits which can be transferred by check. Thus traditional and non-traditional banking institutions were all grouped together, yet their different levels of diversity was not captured in any of the

control variables used. The diverse nature of products offered by different institutions has a potential to have a significant impact on bank performance, and that might provide an explanation for most of the differences or wide ranges in performance and internal characteristics of bank. Subsequent research might benefit in terms of considering variables that capture the diverse nature of different banking institutions in order to minimize the possible distortion of results and conclusions, so that more accurate policy recommendations can be made.

Unavailability of data has prevented the use of a bigger sample which might have provided more variability in observations of the sample, especially in the variables of the structure of the bank supervisory framework. More variation in the latter variables might be better than little variation. Furthermore, the fact that not all data necessary for the study was available, led to the exclusion of some variables like total bank deposits which are also very essential for bank performance. Also lack of data on most banks for other years prevented the use of time series data, which could have allowed for the study to be carried out for a number of years rather than just a single year. Doing so would reveal the trend of how banks respond to factors affecting their performance over time, rather than at a point in time. Results based on trends observed over a time period may be more informative than those occurring at a point in time, since in the later situation one exceptional occurrence may affect the results. For example, the September 11 terrorist attacks in the U.S. led to a decline in tourism to many countries whose security status was questionable, leading to a fall in gross domestic product, hence comparatively poor bank performance in those countries during studied period. Future studies that cover a wider

sample of countries and banks over a longer time period might provide more representative results, on the basis of which, more appropriate policies may be derived.

The use of international data creates room for comparing values that are not exactly the same, given the different accounting standards or different ways of defining balance sheet items in countries all over the world. Furthermore, balance sheets posted on banks' websites were in many instances not accompanied by notes to the accounts, hence there is a possibility that some data in the study might have been misclassified. In this case a more standardized data source may be more reliable.

In a nutshell, there is need for future research to devise ways in which specific policy measures can be represented in the tested models. Also, looking at banks in countries which use a uniform accounting system, or identifying the differences that exists between accounting methods so that any differences could be accounted for, would benefit the precision of the study. The use of data from a single source might help with the uniformity of statistics used, while, the use of primary data sources like balance sheets and income statements obtained directly from banks might help with the accuracy of data. A larger number of countries and banks may provide more variation in observations of the sample, which might improve the accuracy of research findings so that more precise inferences can be made concerning the determinants of bank performance.

REFERENCES

Abreu, Margarida and Victor Mendes. 2002. "Commercial Bank Interest Margins and Profitability: Evidence from E.U Countries", *Porto Working Papers.*

Afanasieff, T.S., Priscilla. M. V. Lhacer and M. I. Nakane. 2002. "The Determinants of Bank Interest Spreads in Brazil." Central Bank of Brazil Working Papers Series no.46.

Angbazo, Lazarus, 1997. "Commercial Banks Net Interest Margin, Default Risk, Interest-Rate, and Off-Balance Sheet Banking." *Journal of Banking and Finance* 21: 55-87.

Basir, Abdel-Hameed M. 2000. "Assessing the Performance of Islamic Banks: Some Evidence from the Middle East." Paper Presented at the 8th ERF Meeting in Jordan.

Bartholomew, Phillip and Gary Whalen. 1995. "Fundamentals of Systemic Risk in the Banking ting System", in *Research in Financial Markets, and Systemic Risk:* Ed., George, G. Kaufman, ed., 73: 17. Greenwich, CT: JAI Press.

Bank of Botswana Annual Report 2003. Gaborone, Botswana.

Bank of International Settlements 64th Annual Report 1994. Basel, Switzerland.

Barth, James R., Daniel E. Nolle, Triphon Phumiwasana and Glenn Yago. 2002. "A Cross-Country Analysis of the Bank Supervisory Framework on Bank Performance". Office of the Comptroller of Currency Economic and Policy Analysis Working Paper no. 2002-2.

Beck, Thorstern, Asli Demirguc-Kunt and Ross Levin. 1999. "A New Database on Financial Development and Structure." The World Bank.

Berger Allen, N. 1995. "The Relationship between Capital and Earnings in Banking." *Journal of Money, Credit and Banking* 27:404-31.

Berger, Allen N., Sally M. Davies and Mark J. Flannery. 1998. "Comparing Market and Supervisory Assessments of Bank Performance: Who Knows What When?" The Federal Reserve Board Finance and Economics Discussion Series no. 32.

Berger, Allen, N. and Loretta J. Mester. 2003. "Explaining the Dramatic Changes in Performance of US banks: Technological Change in Competition". *Journal of Financial Intermediation* 12: 57-95.

Caprio, Gerard and Daniela Klingelbeil. 2002. "Episodes of Systematic and Borderline Banking Crises." Managing the Real and Fiscal Effects of Banking Crises World Bank Discussion Paper no. 428: 31-49.

Chami, Ralph, Mohsin S Khan and Suni Sharma. 2003. "Emerging Issues in Banking Regulation". IMF Working Paper no. 03/101.

Demirguc-Kunt, Asli and Harry Huizinga. 1999. "Determinants of Commercial Bank Interest Margins and Profitability: Some International Evidence". *World Bank Economic Review* 13, no.2 (May): 379-408.

Dewatripont, M and J. Triole. 1994 "The Prudential Regulation of Banks." Cambridge Massachusetts. London, England: The MIT Press.

Evanoff, Douglas D. and Larry D. Wall. 2000 "Subordinated Debt and Bank Capital Reform." Federal Reserve Bank of Atlanta Working Paper no. 2000-24.

Gilbert, R. Alto Andrew P. Meyer and Mark D.Vaughan. 2000. "The Role of a CAMEL Downgrade Model in Bank Surveillance." Federal Reserve Bank of St. Louis, Working Paper no. 2000-021A.

Goyal, Vidhan, K. 2003. "Market Discipline of Bank Risk: Evidence from Subordinated Debt Contracts." Hong Kong University of Science and Technology.

Greene, William H. 2003. "Econometric Analysis." 5th ed., New Jersey: Prentice Hall.

Gujarati, Damodar N. 2003. "Basic Econometrics." 4th ed., New York: McGraw-Hill.

Hirtle, Beverly J. and Jose A. Lopez. 1999. "Supervisory Information and the Frequency of Bank Examinations." Federal Reserve Bank of New York Economic Policy Review, (April).

Honohan, Patrick. 1997. "Banking System Failures in Developing and Transition Countries: Diagnosis and Prediction." Bank of International Settlement Working Papers no. 39.

Jordan, J. L. 1994 "A Market Approach to Banking Regulation." *The Cato Journal* 133, no. 3: 315-332.

Kanes, Edward J. 1997. "Ethical Foundations of Financial Regulation." National Bureau of Economic Research, Working Papers no. 6020.

Kaufman, George G. 1996. "Bank Failures, Systemic Risk, and Bank Regulation." *The Cato Journal,* 16: no. 1.

Kaufman, George G and Kenneth Scott. 2002. "What is Systemic Risk and Do Bank Regulators Retard or Contribute to it?" Paper Presented at a Conference Following the Third Annual Joint Meeting of the European, Japanese, Latin American, and United States Shadow Financial Regulatory Committees in Amsterdam.

Keeley, Michael C. and Gary C. Zimmerman. 1985. "Competition for Money Market Deposit Accounts." Federal Reserve Bank of San Francisco *Economic Review* 1:5-27.

Krainer, John and Lopez, Jose, A. 2002. "Incorporating Equity Market Information into Supervisory Monitoring Models." [draft] Federal Reserve Bank of San Francisco.

Martínez, María, S. and Sergio Schmukler. 1999. "Do Depositors Punish Banks for Bad Behavior? Examining Market Discipline in Argentina, Chile, and Mexico". Central Bank of Chile Working Paper Series no. 48.

Mishkin, Frederick S. 1995. "Comment on Systemic Risk." in *Research in Financial Markets, and Systemic Risk.* ed., George, G. Kaufman, 73:17. Greenwich, CT: JAI Press.

Mishkin, Frederick S. 2001. "Prudential Supervision: What Works and What Doesn't." University of Chicago Press.

Mitchener, Kris. J. 2003. "Bank Supervision, Regulation and Financial Instability During the Great Depression." National Bureau of Economic Research Working Paper no.10475.

Morgan Donald, P. 2002. "Rating Banks: Risk and Uncertainty in an Opaque Industry." *American Economic Review* 92: no. 2.

Naceur, Sammy, B. 2003. 'The Determinants of the Tunisian Banking Industry Profitability: Panel Evidence". Department of Finance *Université Libre de Tunis.*

Neely Michelle C. and David C. Wheelock. 1997. "Why Does Bank Performance Vary Across States?" Federal Reserve Bank of St. Louis *Review* 79: no. 2:27-40.

Nier, Erlend. 2000. "The Profitability of Banks: A Cross-Country Study with a Particular Focus on UK Banks." Paper Presented at a Seminar in Bank of England, London.

Olankule, Akiode, P. and Sobodu O. Olugbenga. 1998. "Bank Performance and Supervision in Nigeria: Analysing the Transition to a Deregulated Economy." *African Economic Research Consortium* Research Paper no. 71 Paper (March). Nairobi, Kenya: The Reagal Press Kenya, Lt.

Quintyn, Marc and Michael W. Taylor. 2002. "Regulatory and Supervisory Independence and Financial Stability" IMF Working Paper no. WP/02/46.

Satta, T. A. 2000. "The Impact of Regulation and Supervision Compliance Costs to Financial Institutions in Tanzania." *The African Journal of Finance and Management* 8: no. 2: 55-63.

Schinasi, Garry J. 2003. "Responsibility of Central Banks for Stability in Financial Markets." IMF Working Paper WP/03/121.

Spong K. 2000. "Banking Regulation Its Purpose, Implementation, and Effects." Federal Reserve Bank of Kansas City.

Van Der Weide Mark E. and Satish M. Kinni. 2002. "Subordinated Debt: A Capital Markets Approach to Bank Regulation." *Boston College Law Review* 41: no. 2: 195-264.

APPENDIX

The following tables represent the results for the 10 models for each of the four bank performance measures. For all results tabulated below, italicized variable names mean the significance of the variable was tested using a 'two tail t-test', otherwise 'one tail t-tests' were used.

TABLE A.1A OLS REGRESSION RESULTS: BEFORE-TAX PROFITS IS THE REGRESSAND

	1	2	3	4	5
C	-0.9597	-8.5258*	-5.4426	-1.2626	-3.7039
	0.8286	0.1071	0.2645	0.8119	0.4284
Equity/Total Assets	0.1445**	0.1414*	0.1537**	0.1381*	0.1340*
	0.1040	0.1051	0.0909	0.1094	0.1187
Log of Total Assets	0.1358	0.1020	0.1274	0.1015	0.1062
	0.2636	0.3884	0.2838	0.3916	0.3714
Loan Provisions/ Total loans	0.1548**	-0.1412**	-0.1494**	-0.1414**	-0.1445**
	0.0553	0.0752	0.0669	0.0764	0.0692
Non Interest Earning Assets/Total Assets	-0.0259	-0.0189	-0.0264	-0.0177	-0.0179
	0.3693	0.4905	0.3618	0.5199	0.5151
Overheads/Total Assets	0.2542**	0.2446**	0.2379**	0.2483**	0.2565**
	0.0258	0.0393	0.0489	0.0353	0.0263
Total Loans/Total Assets	-0.0046	0.0010	0.0014	-0.0012	-0.0034
	0.7856	0.9559	0.9364	0.9418	0.8385
Tax Rate	0.0056	0.0105*	0.0053	0.0112*	0.0113*
	0.4172	0.1259	0.4412	0.1093	0.1099
5 Bank Asset Ratio	0.0616*	0.1022***	0.0908***	-1.2626	0.0701**
	0.1269	0.0104	0.0185	0.8119	0.0831
Foreign Owned Bank Assets	-0.0223	0.0012	-0.0033	0.1381*	-0.0242
	0.3764	0.9669	0.9047	0.1094	0.4209
Private Credit/ Bank Assets	-0.1103*	-0.1164*	-0.1099*	-0.1127*	-0.1166*
	0.1496	0.1361	0.1514	0.1517	0.1372

	1	2	3	4	5
Total Assets of Banks/ GDP	0.0441	0.0710	0.0514	0.0445	0.0608
	0.4772	0.2851	0.4064	0.5248	0.3682
GDP growth rate	-0.4281*	-0.8234***	-0.6050**	-0.5909**	-0.6231**
	0.1075	0.0066	0.0277	0.0407	0.0315
GNI /capital	0.0005	-0.0001	0.0000	0.0005	0.0004
	0.3418	0.9169	0.9266	0.2902	0.391
Inflation	0.0766***	0.0353	0.05901**	0.0531**	0.0547**
	0.0195	0.2029	0.0562	0.0593	0.0612
Bank & firm ownership	0.3680	0.4157	-0.1455	1.6553**	1.0660*
	0.5489	0.5511	0.8220	0.0562	0.138
Bank & NBFI ownership	-0.5817	-1.4309*	-1.2008*	0.2814	-0.6762
	0.5284	0.1289	0.1809	0.8405	0.498
Deposit Insurance	-0.7371	0.6332	-0.5830	0.3346	0.3979
	0.5391	0.5758	0.6190	0.7722	0.728
Supervisor discretion	-0.5846	-0.3945	-0.5558	-0.5415	-0.5148
	0.3890	0.5651	0.4121	0.4347	0.4750
Subordinated debt Required	-0.1237	0.8182	0.7870	-0.4881	-0.1588
	0.9281	0.5731	0.5870	0.7238	0.9068
Single Supervisor	-2.2769**		-2.2789**		
	0.0279		0.0276		
Supervisor Independence					-0.3752
					0.5747
Supervisor Scope				-1.5529	
				0.1852	
Central Bank Supervises		3.0204	3.0246		
		0.1048	0.1092		
R-squared	0.5019	0.5055	0.5055	0.4985	0.4968
F-statistic	6.9015	6.6207	6.6207	6.8094	6.7617

Notes: *, **, *** denote significance at 10%, 5% and 1%. Unlabelled rows show probability.

TABLE A.1B OLS REGRESSION RESULTS: BEFORE-TAX PROFITS IS THE REGRESSAND

	6	7	8	9	10
C	-2.4180	-14.08	-6.9408	-7.7215*	-15.1837
	0.5777	0.6080	0.7104	0.1349	0.5738
Equity/Total Assets	0.1537**	0.1522**	0.1522**	0.1537**	0.1522**
	0.0909	0.0968	0.0968	0.0909	0.0968
Log of Total Assets	0.1274	0.1234	0.1234	0.1274	0.1234
	0.2838	0.3031	0.3031	0.2838	0.3031
Loan Provisions/ Total loans	-0.1494**	-0.1477**	-0.1477**	-0.1494**	-0.1477**
	0.0669	0.0757	0.0757	0.0669	0.0757
Non Interest Earning Assets/Total Assets	-0.0264	-0.0258	-0.0258	-0.0264	-0.0258
	0.3618	0.3870	0.3870	0.3618	0.3870
Overheads/Total Assets	0.2379**	0.2393**	0.2393**	0.2379**	0.2393**
	0.0489	0.0510	0.0510	0.0489	0.0510
Total Loans/Total Assets	0.0014	0.0018	0.0018	0.0014	0.0018
	0.9364	0.9268	0.9268	0.9364	0.9268
Tax Rate	0.0053	0.0053	0.0053	0.0053	0.0053
	0.4412	0.4468	0.4468	0.4412	0.4468
5 Bank Asset Ratio	0.0908***	0.1437	0.1437	0.0908**	0.1437
	0.0185	0.4942	0.4942	0.0185	0.4942
Foreign Owned Bank Assets	-0.0033	0.0562	0.0562	-0.0033	0.0562
	0.9047	0.6130	0.6130	0.9047	0.6130
Private Credit/ Bank Assets	-0.1099*	-0.1126*	-0.1126*	-0.1099*	-0.1126*
	0.1514	0.1972	0.1972	0.1514	0.1972
Total Assets of Banks/ GDP	0.0514	0.0812	0.0812	0.0514	0.0812
	0.4064	0.5859	0.5859	0.4064	0.5859
GDP growth rate	-0.6050**	-1.0681	-1.0681	-0.6050**	-1.0681
	0.0277	0.2511	0.2511	0.0277	0.2511
GNI /Capital	0.0000	-0.0008	-0.0008	0.0000	-0.0008
	0.9266	0.6494	0.6494	0.9266	0.6494
Inflation	0.0590**	0.0127	0.0127	0.0590**	0.0127
	0.0562	0.8567	0.8567	0.0562	0.8567
Bank & Firm Ownership	-0.1455	-1.0677	-1.0677	-0.1455	-1.0677
	0.822	0.7945	0.7945	0.8220	0.7945
Bank & NBFI Ownership	-1.2008	-2.5424	-2.5424	-1.2010*	-2.5424
	0.1809	0.7058	0.7058	0.1809	0.7058
Deposit Insurance	0.3980	0.6473	0.6473	-0.5830	0.6473
	0.728	0.7354	0.7354	0.6190	0.7354
Supervisor Discretion	-0.5558	0.0295	0.0295	-0.5558	0.0295
	0.4121	0.9781	0.9781	0.4121	0.9781
Subordinated Debt Required	0.7870	2.2799	2.2799	0.7870	2.2799
	0.587	0.5979	0.5979	0.5870	0.5979

	6	7	8	9	10
Single Supervisor	-5.3035**	-1.1049	-8.2429		
	0.0257	0.4881	0.3431		
Supervisor Independence		2.0603	2.0603		2.0603
		0.3851	0.3851		0.3851
Supervisor Scope		-0.5224	0.0127		-0.5224
		0.9421	0.8567		0.9421
Central Bank Supervises		7.1380	-8.2429	5.3035**	8.2429
		0.4383	0.3431	0.0257	0.3431
*Central Bank Supervises Bank*Single Supervisor*	3.0246		7.1380	-2.2789**	-1.1049
	0.1092		0.4383	0.0276	0.4881
R-squared	0.5055	0.5062	0.5062	0.5055	0.5062
F-statistic	6.6207	5.9723	5.9723	6.6207	5.9723

Notes: *, **, *** denote significance at 10%, 5% and 1%. Unlabelled rows show probability.

TABLE A.2A OLS REGRESSION RESULTS: RETURN ON ASSETS IS THE REGRESSAND

	1	2	3	4	5
C	1.2888	-5.4498*	-2.8778	1.4130	-0.9214
	0.6908	0.1528	0.4179	0.7160	0.7815
Equity/Total Assets		0.104484*			
	0.1062**	*	0.1147**	0.1017**	0.0978**
	0.0795	0.081	0.0651	0.0859	0.096
Log of Total Assets	0.1142	0.0852	0.1064	0.0844	0.0885
	0.2287	0.3469	0.2470	0.3529	0.3322
Loan Provisions/					
Total loans	-0.1244**	-0.1126**	-0.1194**	-0.1125**	-0.1154**
	0.0392	0.0602	0.0509	0.0614	0.0541
Non Interest Earning					
Assets/ Total Assets	-0.0123	-0.00652	-0.0127	-0.0053	-0.0055
	0.5192	0.7227	0.5056	0.7722	0.7652
Overheads/Total Assets	0.1648**	0.1552**	0.1496*	0.1582**	0.1657**
	0.0569	0.0878	0.1073	0.0792	0.0589
Total Loans/Total Assets	-0.0049	0.0852	0.0007	-0.0016	-0.0036
	0.7015	0.3469	0.9586	0.9018	0.7803
Tax Rate	-0.0015	-0.1126**	-0.0018	0.0032	0.0034
	0.8130	0.0602	0.7676	0.5923	0.5825
5 Bank Asset Ratio	0.0316	0.0681***	0.0587**	0.0165	0.0380*
	0.2957	0.0144	0.0301	0.6509	0.1988
Foreign Owned					
Bank Assets	-0.0226	-0.0011	-0.0049	-0.0296*	-0.0256
	0.2235	0.9575	0.8075	0.1548	0.2632
Private Credit/Bank					
Assets	0.0133	0.0003	-0.0738	-0.0757*	-0.0794*
	0.7631	0.9807	0.1866	0.1851	0.1622
Total Assets of					
Banks/GDP	-0.0049	0.0026	0.0200	0.0110	0.026482
	0.7015	0.6581	0.6453	0.8257	0.5758
GDP Growth Rate	-0.2905*	-0.637***	-0.4510***	-0.4188**	-0.4479**
	0.1405	0.0021	0.0184	0.0419	0.0308
GNI /Capital	0.0005*	0.0001	0.0002	0.0006*	0.0005*
	0.1560	0.8343	0.6722	0.1090	0.1796
Inflation	0.0506**	0.0145	0.0343**	0.0312*	0.0328*
	0.0258	0.4386	0.0954	0.1073	0.1098
Bank & Firm Ownership	0.1582	0.1490	-0.3191	1.3304**	0.7720*
	0.7592	0.7894	0.5608	0.0498	0.1694
Bank & NBFI Ownership	-0.1319	-0.8992*	-0.7073	0.7361	-0.1794
	0.8468	0.1783	0.2680	0.4954	0.8077
Deposit Insurance	-1.0947	0.0629	-0.9516	-0.2204	-0.16651
	0.2235	0.9374	0.2690	0.7903	0.84
Supervisor Discretion	-0.5615	-0.4003	-0.5349	-0.5416	-0.52442
	0.2729	0.4505	0.2944	0.3105	0.3468
Subordinated Debt					
Required	-0.2675	0.6049	0.5789	-0.6252	-0.31236
	0.7935	0.5722	0.5846	0.5496	0.7595

	1	2	3	4	5
Single Supervisor	-1.899***		-1.9010***		
	0.0093		0.0084		
Supervisor Independence					-0.3991
					0.4622
Supervisor Scope				-1.5054	
				0.1151	
Central Bank Supervises		2.8077*	2.8112*		
		0.0639	0.0664		
R-squared	0.4773	0.4757	0.4842	0.4733	0.4698
F-statistic	6.2544	6.2161	6.0805	6.1546	6.069

Notes: *, **, *** denote significance at 10%, 5% and 1%. Unlabelled rows show probability.

TABLE A.2B OLS REGRESSION RESULTS: RETURN ON ASSETS IS THE REGRESSAND

	6	7	8	9	10
C	-0.0666	-7.5788	-2.0930	-4.7788*	-8.4982
	0.9829	0.6910	0.8714	0.2002	0.6494
Equity/Total Assets	0.1147**	0.1139**	0.1135**	0.1147**	0.1135**
	0.0651	0.0705	0.0705	0.0651	0.0705
Log of Total Assets	0.1064	0.1026	0.1026	0.1064	0.1026
	0.2470	0.2682	0.2682	0.247	0.2682
Loan Provisions/Total loans	-0.1194**	-0.1177**	-0.1177**	-0.1194**	-0.1177**
	0.0509	0.0587	0.0587	0.0509	0.0587
Non Interest Earning Assets/Total Assets	-0.0127	-0.0120	-0.0120	-0.0128	-0.0120
	0.5056	0.5412	0.5412	0.5056	0.5412
Overheads/Total Assets	0.1496*	0.1503*	0.1504*	0.1496*	0.1504*
	0.1073	0.1112	0.1112	0.1073	0.1112
Total Loans/Total Assets	0.0007	0.0007	0.0007	0.0007	0.0007
	0.9586	0.9628	0.9628	0.9586	0.9628
Tax Rate	-0.0018	-0.0018	-0.0018	-0.0018	-0.0018
	0.7676	0.7675	0.7675	0.7676	0.7675
5 Bank Asset Ratio	0.0587**	0.0828	0.0828	0.0587**	0.0828
	0.0301	0.5661	0.5661	0.0301	0.5661
Foreign Owned Bank Assets	-0.0049	0.0374	0.0374	-0.005	0.0374
	0.8075	0.6321	0.6321	0.8075	0.6321
Private Credit/Bank Assets	-0.0739*	-0.0740	-0.0740	-0.0738*	-0.0740
	0.1866	0.2411	0.2411	0.1866	0.2411

	6	7	8	9	10
Total Assets of Banks/GDP	0.0200	0.0339	0.0339	0.020044	0.0339
	0.6453	0.7443	0.7443	0.6453	0.7443
GDP growth rate	-0.4550***	-0.7795	-0.7795	-0.4550***	-0.7795
	0.0184	0.2335	0.2335	0.0184	0.2335
GNI /capital	0.0002	-0.0004	-0.0004	0.0002	-0.0004
	0.6722	0.7407	0.7407	0.6722	0.7407
Inflation	0.0343**	-0.0009	-0.0009	0.0343**	-0.0009
	0.0954	0.9855	0.9855	0.0954	0.9855
Bank & firm ownership	-0.3191	-0.6270	-0.6270	-0.319	-0.6270
	0.5608	0.8248	0.8248	0.5608	0.8248
Bank & NBFI ownership	-0.7073	-1.1288	-1.1288	-0.707	-1.1288
	0.2680	0.8085	0.8085	0.268	0.8085
Deposit Insurance	-0.9516	0.0033	0.0033	-0.9516	0.0033
	0.2690	0.9981	0.9981	0.269	0.9981
Supervisor discretion	-0.5349	-0.0662	-0.0662	-0.535	-0.0662
	0.2944	0.9328	0.9328	0.2944	0.9328
Subordinated debt Required	0.5789	1.4105	1.4105	0.5789	1.4105
	0.5846	0.6424	0.6424	0.5846	0.6424
Single Supervisor	-4.7122**	-0.9194	-6.4052		
	0.0115	0.4197	0.2933		
Supervisor Independence		1.9440	1.9440		1.9440
		0.2537	0.2537		0.2537
Supervisor Scope		-1.3226	-1.3226		-1.3226
		0.7896	0.7896		0.7896
Central Bank Supervises		5.4858		4.7122**	6.4052
		0.3986		0.0115	0.2933
*Central Supervises Bank*Single Supervisor*	2.8112*		5.4858	-1.901***	-0.9194
	0.0664		0.3986	0.0084	0.4197
R-squared	0.4842	0.4856	0.4856	0.4842	0.4856
F-statistic	6.0805	5.5005	5.5005	6.0805	5.5005

Notes: *, **, *** denote significance at 10%, 5% and 1%. Unlabelled rows show probability.

TABLE A.3A OLS REGRESSION RESULTS: RETURN ON EQUITY IS THE REGRESSAND

	1	2	3	4	5
C	15.9761	-44.003	-21.8859	21.0927	-2.6717
	0.6212	0.2254	0.5585	0.5280	0.9248
Equity/Total Assets	-0.22828	-0.2391	-0.1509	-0.2589	-0.2985
	0.3385	0.3155	0.5280	0.4011	0.3309
Log of Total Assets	1.9423**	1.6897**	1.8717**	1.6734**	1.7172**
	0.0255	0.0507	0.0297	0.0780	0.0752
Loan Provisions/ Total loans	-0.1369	-0.0329	-0.0912	-0.0272	-0.0568
	0.6353	0.0507	0.7503	0.9320	0.8556
Non Interest Earning Assets/ Total Assets	0.1763	0.2260**	0.17252	0.2375**	0.2352**
	0.2097	0.1026	0.2150	0.0880	0.0943
Overheads/ Total Assets	0.2826	0.1933	0.1725	0.2079	0.2857
	0.4686	0.6254	0.7117	0.6796	0.5605
Total Loans/Total Assets	-0.1410*	-0.0933	-0.0810	-0.1069	-0.1277
	0.1334	0.3388	0.060	0.2045	0.1316
Tax Rate	0.0227	0.05749	0.0199	0.0632	0.0646
	0.7087	0.3208	0.7394	0.2362	0.2398
5 Bank Asset Ratio	0.5763**	0.9040***	0.8225***	0.4096*	0.6285**
	0.0814	0.0109	0.0196	0.2014	0.0251
Foreign Owned Bank Assets	-0.2702*	-0.0774	-0.109754	-0.2589	-0.3029**
	0.1461	0.7023	0.5850	0.4011	0.1007
Private Credit/ Bank Assets	-0.0436	-0.08641	-0.03989	-0.0496	-0.0875
	0.8938	0.7913	0.9016	0.8886	0.8045
Total Assets of Banks/GDP	-0.6404**	-0.4385*	-0.5791**	-0.6884**	-0.53010**
	0.0392	0.1484	0.0606	0.0251	0.0601
GDP growth rate	-1.8365	-4.8973***	-3.3310**	-2.8588**	-3.1649***
	0.3018	0.0065	0.8380	0.0299	0.0200
GNI /capital	0.0067*	0.002607	0.0032	0.0075**	0.0066*
	0.1499	0.5996	0.5043	0.0797	0.1336
Inflation	0.6760***	0.3577**	0.5278***	0.5088***	0.5249***
	0.0004	0.0182	0.0011	0.0006	0.0011
Bank & firm ownership	-8.7564*	-9.0680**	-13.0931***	2.3813	-3.3338
	0.0947	0.0900	0.0219	0.6497	0.4714
Bank & NBFI ownership	-1.1325	-8.0118	-6.360914	7.9227	-1.3988
	0.8673	0.2707	0.3792	0.3305	0.8142
Deposit Insurance	-6.6594	3.3659	-5.3585	0.6503	1.2386
	0.4648	0.6702	0.5534	0.9315	0.8736
Supervisor discretion	-12.9120**	-11.5120**	-12.6695**	-12.9126**	-12.6885**

	0.0306	0.0528	0.0321	0.0083	0.0107
	1	**2**	**3**	**4**	**5**
Subordinated debt Required	-0.6186	7.2964	7.072692	-4.2720	-1.0751
	0.9486			0.6597	0.9113
Single Supervisor	-16.3302**		-16.3478**		
	0.0448		0.0425		
Supervisor Independence					-3.8237
					0.4358
Supervisor Scope				-15.2036**	
				0.0487	
Central Bank Supervises		25.5153**	25.5453**		
		0.0551	0.0521		
R-squared	0.5895	0.5884	0.6007	0.5861	0.5789
F-statistic	9.8355	9.7932	9.7442	9.7003	9.4184

Notes: *, **, *** denote significance at 10%, 5% and 1%. Unlabeled row shows Probability.

TABLE A.3B OLS REGRESSION RESULTS: RETURN ON EQUITY IS THE REGRESSAND

	6	**7**	**8**	**9**	**10**
C	3.6594	135.7706	116.4788	-38.2337*	121.7858
	0.9106	0.5741	0.4520	0.2878	0.5958
Equity/Total Assets	-0.1509	-0.1540	-0.1540	-0.1509	-0.1540
	0.528	0.5206	0.5206	0.5280	0.5206
Log of Total Assets	1.8717**	1.8332**	1.8332**	1.871737**	1.8332**
	0.0297	0.0333	0.0333	0.0297	0.0333
Loan Provision/ Total loans	-0.0912	-0.0624	-0.0624	-0.0912	-0.0624
	0.07503	0.8280	0.8280	0.07503	0.8280
Non Interest Earning Assets/ Total Assets	0.1725	0.1908**	0.190835*	0.1725*	0.1908*
	0.2150	0.1721	0.1721	0.2150	0.1721
Overheads/Total Assets	0.1449	0.1178	0.1178	0.1449	0.1178
	0.7117	0.7649	0.7649	0.7117	0.7649
Total Loans/ Total Assets	-0.0900	-1.2886**	-0.1108	-0.0900	-0.1108
	0.060	0.2310	0.2310	0.060	0.2310
Tax Rate	0.0199	-0.1108	0.0200	0.0199	0.0200
	0.7394	0.7401	0.71401	0.7394	0.7401
5 Bank Asset Ratio	0.8225***	0.0200	-0.4698	0.8225***	-0.4698

	6	7	8	9	10
	0.0196	0.7918	0.7918	0.0196	0.7918
Foreign Owned Bank Assets	-0.1098	-0.5046	-0.5046	-0.1098	-0.5046
	0.5850	0.6445	0.6445	0.5850	0.6445
Private Credit/ Bank Assets	-0.0399	0.1004	0.1004	-0.0399	0.1004
	0.9016	0.7198	0.7198	0.9016	0.7198
Total Assets of Banks/GDP	-0.5791**	-1.2886	-1.2886	-0.57918**	-1.28860
	0.0606	0.2051	0.2051	0.0606	0.2051
GDP growth rate	-3.3310**	0.0925	0.0925	-3.33110**	0.0925
	0.8380	0.9917	0.9917	0.8380	0.9917
GNI /capital	0.0033	0.0120	0.0120	0.0033	0.0120
	0.5043	0.5240	0.5240	0.5043	0.5240
Inflation	0.5279***	0.6785	0.6785	0.5278***	0.6785
	0.0011	0.2214	0.2214	0.0011	0.2214
Bank & Firm Ownership	-13.0931***	17.2241	17.2241	-13.0931***	17.2241
	0.0219	0.6482	0.6482	0.0219	0.6482
Bank & NBFI Ownership	-6.3609	39.5731	39.5731	-6.3609	39.5731
	0.3792	0.4832	0.4832	0.3792	0.4832
Deposit Insurance	-5.3585	-8.0083	-8.0083	-5.3585	-8.0083
	0.5535	0.6936	0.6936	0.5535	0.6936
Supervisor Discretion	-12.6695***	-12.9294	-12.9294	-12.6695***	-12.9294
	0.0321	0.1939	0.1939	0.0321	0.1939
Subordinated debt Required	7.0727	-18.8708	-18.8708	7.0727	-18.8708
	0.4814	0.5268	0.5268	0.4814	0.5268
Single Supervisor	-41.8931***	-13.9848	5.3070		
	0.007	0.7394	0.9452		
Supervisor Independence		19.5230	19.5230		19.5230
		0.3441	0.3441		0.3441
Supervisor Scope		-62.5798	-62.5798		-62.5798
		0.2412	0.2412		0.2412
Central Bank Supervises		-19.2918		41.89311***	-5.3070
		0.8289		0.007	0.9452
*Central bank Supervises*Single Bank Supervisor*	25.5453**		-19.2918	-16.3478**	-13.9848
	0.0521		0.8287	0.0425	0.3958
R-squared	0.6007	0.6070	0.6070	0.6007	0.6070
F-statistic	9.7442	8.9973	8.9973	9.7442	8.9973

Notes: *, **, *** denote significance at 10%, 5% and 1%. Unlabelled rows show probability.

TABLE A.4A OLS REGRESSION RESULTS: NET INTEREST MARGIN IS THE REGRESSAND

	1	2	3	4	5
C	-12.777*	-37.7671**	-24.7302**	-21.4240**	-39.5068**
	8.0185	0.0465	0.0542	0.0237	0.0347
Equity/Total Assets	0.3225***	0.3211***	0.3211***	0.3225***	0.3211***
	0.1299	0.0155	0.0155	0.0142	0.0155
Log of Total Assets	0.3940**	0.3920**	0.3920**	0.3940**	0.3920*
	0.2203	0.0811	0.0811	0.0760	0.0811
Loan Provisions/ Total Assets	0.1321	0.1321	0.1321	0.1321	0.1321
	0.1303	0.3168	0.3168	0.3122	0.3168
Non Interest Earning Assets/ Total Assets	0.0088	0.008258	0.0083	0.0088	0.0083
	0.0307	0.7911	0.7911	0.7748	0.7911
Overheads/Total Assets	0.4067	0.4099	0.4099	0.4067	0.4099
	0.3348	0.2255	0.2255	0.2266	0.2255
Total Loans/ Total Assets	0.0469*	0.0485*	0.0485*	0.0468*	0.0485*
	0.0342	0.1689	0.1689	0.1732	0.1689
Tax Rate	0.0023	0.0022	0.0022	0.0023	0.0022
	0.0103	0.8297	0.8297	0.8261	0.8297
5 Bank Asset Ratio	0.1360***	0.2741**	0.2741***	0.1360***	0.2741***
	0.0511	0.0213	0.0213	0.0087	0.0213
Foreign Owned Bank Assets	0.0433	0.1323	0.1322	0.0433	0.1322
	0.0532	0.2235	0.2235	0.4166	0.2235
Private Credit/Bank Assets	-0.0327	-0.0444	-0.0444	-0.0327	-0.0444
	0.0654	0.5263	0.5263	0.6181	0.5263
Total Assets of Banks/GDP	0.0104	0.0870	0.0870	0.0104	0.0870
	0.0549	0.3550	0.3550	0.8504	0.3550
GDP Growth Rate	-0.0809	-0.7950	-0.7950	-0.0809	-0.7950
	0.3361	0.2822	0.2822	0.8101	0.2822
GNI /Capital	-0.0014**	-0.0029**	-0.0029**	-0.0014**	-0.0029**
	0.0006	0.0451	0.0451	0.0299	0.0451
Inflation	0.0405*	-0.0189	-0.0189	0.0405*	-0.0189
	0.0299	0.7667	0.7667	0.1782	0.7667
Bank & Firm Ownership	-1.9625**	-4.8583**	-4.8583**	-1.9625**	-4.8583**
	0.9716	0.0675	0.0675	0.0454	0.0675
Bank & NBFI Ownership	-1.3973	-5.7247*	-5.7247*	-1.3973	-5.7247*
	1.1043	0.1495	0.1495	0.2079	0.1495
Deposit Insurance	-0.2153	1.2778	1.2778	-0.2153	1.2778
	1.6061	0.4549	0.4549	0.8935	0.4549
Supervisor Discretion	-0.3762	0.2713	0.2713	-0.3762	0.2713
	1.1048	0.8588	0.8588	0.7340	0.8588

	1	2	3	4	5
Subordinated Debt Required	3.6093**	6.8463**	6.8463**	3.6092**	6.8463**
	1.8770	0.0309	0.0309	0.0566	0.0309
Single Supervisor		-1.7397	-14.777**		
		0.3668	0.0483		
Supervisor Independence		0.9977	0.9977		0.9977
		0.7103	0.7103		0.7103
Supervisor Scope		3.3611	3.3611		3.3611
		0.4225	0.4225		0.4225
Central Bank Supervises		13.0369**		8.6466**	14.7766**
		0.0997		0.0337	0.0483
*Central Supervises Bank*Single Supervisor*	5.7890*		13.0369*	-2.8577**	-1.7397
	3.2768		0.0997	0.0448	0.3668
R-squared	0.6529	10.9754	0.6532	0.6529	0.6532
F-statistic	12.1838	0.6532	10.9754	12.1838	10.9754

Notes: *, **, *** denote significance at 10%, 5% and 1%. Unlabelled rows show probability.

TABLE A.4B OLS REGRESSION RESULTS: NET INTEREST MARGIN IS THE REGRESSAND

	6	7	8	9	10
C	-12.7773*	-37.7671**	-24.7302*	-21.4240**	-39.5068**
	0.1134	0.0465	0.0542	0.0237	0.0347
Equity/Total Assets	0.3225***	0.3211***	0.3211***	0.3225***	0.3211***
	0.0142	0.0155	0.0155	0.0142	0.0155
Log of Total Assets	0.3940**	0.3920**	0.3920**	0.3940	0.3920*
	0.0760	0.0811	0.0811	0.0760	0.0811
Loan Provisions/ Total loans	0.0405*	0.1321	0.1321	0.1321	0.1321
	0.1782	0.3168	0.3168	0.3122	0.3168
Non Interest Earning Assets/ Total Assets	0.0088	0.0083	0.0083	0.0088	0.0083
	0.7748	0.7911	0.7911	0.7748	0.7911
Overheads/ Total Assets	0.4067	0.0083	0.4099	0.4067	0.4099
	0.2266	0.7911	0.2255	0.2266	0.2255
Total Loans/ Total Assets	0.0469	0.4099	0.0489*	0.0469*	0.0485*
	0.1732	0.2255	0.1689	0.1732	0.1689

	6	7	8	9	10
Tax Rate	0.0023	0.0485*	0.0022	0.0023	0.0022
	0.8261	0.1689	0.8297	0.8261	0.8297
5 Bank Asset Ratio	0.1360***	0.2741**	0.2741*	0.1360***	0.2741***
	0.0087	0.0213	0.0213	0.0087	0.0213
Foreign Owned Bank Assets	0.0433	0.1322	0.1322	0.0433	0.1322
	0.4166	0.2235	0.2235	0.4166	0.2235
Private Credit/ Bank Assets	-0.0327	-0.0444	-0.0444	-0.0327	-0.0444
	0.6181	0.5263	0.5263	0.6181	0.5263
Total Assets of Banks/GDP	0.0104	0.0870	0.0870	0.0104	0.0870
	0.8504	0.3550	0.3550	0.8504	0.3550
GDP Growth Rate	-0.0809	-0.7950	-0.7950	-0.0809	-0.7950
	0.8101	0.2822	0.2822	0.8101	0.2822
GNI /Capital	-0.0014*	-0.0029**	-0.0029**	-0.0014**	-0.0029**
	0.0299	0.0451	0.0451	0.0299	0.0451
Inflation	0.040502*	-0.0189	-0.0189	0.040502*	-0.0189
	0.1782	0.7667	0.7667	0.1782	0.7667
Bank & Firm Ownership	-1.9625**	-4.8583*	-4.8583*	-1.9625**	-4.8583*
	0.0454	0.0675	0.0675	0.0454	0.0675
Bank & NBFI Ownership	-1.3973	-5.7247	-5.7247	-1.3973	-5.7247
	0.2079	0.1495	0.1495	0.2079	0.1495
Deposit Insurance	-0.2153	1.2777**		-0.2153	1.2778
	0.8935	0.4549		0.8935	0.4549
Supervisor Discretion	-0.3762	0.2713	0.2713	-0.3762	0.2713
	0.7340	0.8588	0.8588	0.7340	0.8588
Subordinated debt Required	0.0104	6.8463**	6.8463**	3.6093*	6.8463**
	0.8504	0.0309	0.0309	0.0566	0.0309
Single Supervisor	-8.6466**	-1.7397	-14.7767**		
	0.0337	0.3668	0.0483		
Supervisor Independence		0.9977	0.9977		0.9977
		0.7103	0.7103		0.7103
Supervisor Scope		3.3611	3.3611		3.3611
		0.4225	0.4225		0.4225
Central Bank Supervises		13.0369*			14.7767**
		0.0997			0.0483
Central Bank Supervises Bank Single Supervisor*	5.7890*		3.3611*		-1.7397
	0.0795		0.4225		0.3668
R-squared	0.6529	0.6532	0.6532	0.6529	0.6532
F-statistic	12.1838	10.9754	10.9754	12.1837	10.9754

Notes: *, **, *** denote significance at 10%, 5% and 1%. Unlabelled rows show probability.