

**Private Sector Incentives and Bank Risk Taking:  
A Test of Market Discipline Hypothesis in Deposit Money Banks in  
Nigeria**

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### **Abstract**

*We use panel data of Deposit Money Banks in Nigeria to investigate depositors' reaction to changes in bank risks as proxied by their fundamentals. We are concerned with two questions that are relevant to the design of a new regulatory framework for the Nigerian banking industry: 1) whether depositors respond to bank risk as standard theories predict; and 2) if they do, whether such responses are strong enough to discipline deposit money banks for excessive risk taking? Using a two stage framework, (monitoring and influence), and a two channel approach (quantity channel and price/interest rate channel), our results suggest that deposit growth is weakly sensitive to bank risks. However, the interest rate channel of depositor discipline is not as clear. Only inter-bank deposit interest rate is shown to respond to bank fundamentals. Both Total deposit interest rate and time deposit rates are less sensitive to bank fundamentals. Furthermore there is no evidence that banks do in fact respond to signals sent by depositors as suggested by market discipline hypothesis. Only inter-bank interest rates show evidence of mean reversion.*

## 1.0 Introduction

Market discipline in banking refers to a situation in which bank related agents, (depositors, bondholders and stockholders), face costs that are positively related to bank risks (understood as the bank's expected capacity to honour its claims) and react on the basis of these costs (Berger, 1991). Thus market discipline hypothesis, in particular depositor discipline, assumes that depositors distinguish riskier banks and react in consequence by punishing banks perceived to be taking excessive risks. The punishment may manifest itself in three forms: *the price effects/interest rate channel* where investors require higher returns on bank liabilities, *the quantity effect/deposit growth channel* where depositors withdraw their funds and the *valuation effect*, where stock market participants drive down the value of the bank stocks.

Faced by increasing costs and greater uncertainty, depositors can either demand higher returns (price effects) or withdraw their deposits (quantity effects) (Berger 1991; Peria and Schmukler, 2001). The threat of action therefore imposes discipline by signaling to deposit money banks the riskiness of their services. Similarly, debt-holders can demand a higher yield on bank debts thereby increasing the cost of funds for riskier banks. Likewise, equity holders and sub-debt holders can sell their shares thereby putting downward pressure on the share prices and placing management under increased scrutiny, (Berger, 1991). To the extent that such prices reflect the (absolute or relative) probability of loss by issuing banks, they can provide valuable input into decisions by supervisors and counter-parties affecting the bank. For example, the frequency and intensity of on- and off-site supervisions, supervisory ratings, bank-specific capital requirements and corrective measures could be informed by volatilities in rates paid on sub-ordinated debt. Thus, through the (price) signals on sub-ordinated debt, investors can assist supervisors assess the condition of issuing banks.

Furthermore, market discipline does not only involve depositors' reaction but also the subsequent response of banks. The main purpose of market discipline is achieved if banks act conservatively to limit risks, and this target can only be achieved if banks respond to depositors' signal, as implied by the demand for higher interest rates and conservative withdrawals, by reducing their risks. Flannery (2001) and Bliss and Flannery, (2002) distinguish two components of market discipline: *monitoring and influence*. Monitoring refers to the process whereby investors correctly understand changes in bank conditions and incorporates these assessments into the banks security prices. Influence, on the other hand, refers to the process by which a security price change engenders bank responses to counteract adverse changes in bank conditions. Kwast et al (1999) further categorize market influence into direct and indirect. Direct influence refers to the process by which investors induce banks to avoid risky investments by raising a risky bank's cost of funds or reducing a risky bank's sources of funds. Banks are therefore, not only

'punished' for maintaining high risk profiles, but the ex-ante anticipation of higher funding costs act as a deterrent on risk-taking behaviour. Indirect influence refers to a situation where by security prices serve as a signal to supervisors and induce them to take steps designed to reduce a bank's risk exposures.

If present and effective, market discipline should lead to a lower probability of individual bank failure, lower generalized banking crises and a healthier banking sector as a whole, (Levy-Yeyati et al, 2004). Bank performance statistics in Nigeria, however, do not support this hypothesis. The number of distressed banks increases from fifteen (15) in 1991 to about sixty, (60) in 1995. In 1998, the regulatory authorities closed about twenty-six (26) banks, at once, for their technical insolvencies. In the year 2002, two (2) more banks were closed bringing the total number of banks closed since 1992 to thirty-six (36). In 2003, official reports from Nigeria Deposit Insurance Corporation. NDIC, indicate that more than forty-five (45) out of the eighty-nine (89) operating banks in Nigeria are in one form of financial stress or the other and that about eleven (11) of these banks are technically distressed, (NDIC 2003). All these took place in the face of greater responsibility given private sector agents in monitoring and supervising banks. These and the anecdotal evidences of depositor runs on individual banks that have dotted the industry raises questions about the incentives of depositors and the quality of information they use to assess banks' risk exposures.

We are concerned with two questions that are relevant to the design of a regulatory framework for the banking system: 1) whether depositors respond to bank risks as standard theories predict? 2), if they do, whether such responses are strong enough to deter banks from excessive risk taking?

A banking system in which market discipline is an important constraining force on banks' risk taking should display three characteristics: First market measures of, and reactions to bank risks should vary across banks. A banking sector in which depositors do not distinguish among banks is one in which market discipline is unlikely to exist. Second, differences in deposit interest rates and deposit growths across banks should reflect differences in banks' risk characteristics. Third depositor discipline should constrain excessive risk taking by bank. We therefore investigate the following specific issues with respect to Nigerian banks: whether bank deposit growths and deposit interest rates are sensitive to bank risk exposures; whether differences in deposit interest rates and deposit growth across banks reflect differences in bank risk characteristics; the responsiveness of depositors to bank risks before, during and after crises; whether banks effectively respond to the signals provided by depositors by altering their risk preferences, and finally we try to make useful policy suggestions for bank regulatory design in Nigeria.

The argument on whether depositors can monitor and control banks for risky behaviour is an important topic both for theory and Policy. If depositors respond to risk by demanding higher interest rates and or withdrawing their funds, then this suggest that depositors may be more sophisticated than theory suggest and that implies that there may be less need for protection in terms of extensive deposit insurance schemes. An objection to this is that depositor runs are very costly, but then, if banks perceive that depositors may run, then banks should take appropriate action to avert such outcome. Deposit insurance may still be necessary but the argument would then be for systemic protection, and not defend depositors per se, and would go in the direction of supporting more partial schemes. More importantly, if depositors respond to bank risks, then market discipline should be seen more generally as a complement to the official regulation and supervision. In particular, if given timely information, markets will tend to react quickly reducing the possibility of regulatory forbearance. This suggests that regulation should emphasize transparency and disclosure to ensure prompt and accurate information to enhance market discipline, rather than relying entirely, on traditional regulatory discipline. Indeed, the latter might be seen as a response to the actions of the market when the situation becomes non-viable, rather than leading market actions.

The potential benefits of market discipline could be particularly important in developing economies. This is primarily because financial systems in these economies tend to be predominantly bank-based. Accordingly, in view of the overwhelming dominance of banks, it is widely believed that a well-functioning banking system can play a significant role in efficient allocation of savings. However, in view of the growing complexity of banking organizations, traditional procedures of supervision can, at best, have limited appeal. As a consequence, considerable interest has been generated in recent times in harnessing market forces to assist regulatory goals.

The main hypothesis underlying this study is of two folds: (1) that depositors exert market discipline by monitoring their banks and withdrawing their funds and/or demanding higher yields on deposits whenever the performance of their banks is no longer satisfactory, and (2) that banks respond to signals sent by depositors by behaving in a manner that reduces their underlying risks.

## **1.2 Motivations for the study**

The rationale for giving such an important role to market discipline is based on the existence of many types of regulatory and supervisory failures. Risk-based capital standards and risk-based deposit insurance premium are regulatory devices designed to impose higher costs on banks that

increase risks.<sup>1</sup> More generally, safety and soundness supervision can be thought of as a means by which government makes up for the absence of private market mechanisms for reining in bank risk by imposing implicit and explicit costs on bank activities that increase risk. After all, deposit insurance is equivalent to a put option given to the depositors by the deposit insurance agency, (Merton, 1977). Thus, calls for deposit insurance reform generally point to the need to make deposit insurance premium more risk sensitive. The argument is that risk based insurance premium will discourage insured banks from taking excessive risk because a bank facing higher premium will think twice before undertaking a high risk activity. The logic is sound: let banks face the true cost of risk and they will appropriately balance the trade-off between risk and return. If this argument holds, the efficiency of a regulatory system that adopts two regulatory frameworks (risk-based deposit insurance and market discipline frameworks) - using the same information set to achieve the same regulatory objective - could be questioned. It could therefore be argued that what Nigeria needs is to make the existing flat rate deposit insurance premium risk sensitive instead of adopting market discipline framework, after all explicit deposit insurance structure is already on ground.

While the argument for risk-based deposit insurance premium is seemingly correct from the standard perspective of price theory, this argument requires the deposit insurer to be able to observe, correctly, the risk characteristics of bank's investment portfolio. There are good reasons to think that this is not the case. It is difficult for outsiders to evaluate a bank loan or complicated portfolio of financial derivatives (Prescott, 2002:87). Under such conditions, risk based deposit insurance premium are not enough to control moral hazard due to private information problem. Furthermore, John, John and Senbet (1991) point out that the risk incentives of depository institutions arise fundamentally from limited liability and the associated convex payoff of equity holders. The risk incentive is unchanged by deposit being insured and hence excessive risk taking by depository institutions is not solely attributable to flat rate insurance premium. Consequently the incentive problem cannot be resolved through insurance premium.

Furthermore, there may be times when the incentives of government regulators are at odds with the mission of disciplining bank risk-taking. Policy makers may wish to forbear if they perceive a political or social benefit from delaying the recognition of bank failure. A policy of regulatory forbearance greatly exacerbates the incentive problems discussed above because it allows banks to continue operating with very low or negative net worth. In the wisdom of Peria and Schmukler (1999), the market as an anonymous force cannot be lobbied for forbearance and could react more quickly than the regulators to curb bank excessive risk taking.

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<sup>1</sup> In principle, risk-based deposit insurance could substitute for the risk sensitivity of uninsured deposits and a regulatory arrangement that allow for some adjustments based on an institution's riskness.

Since the seminal work of Jensen and Meckling (1976), the agency cost emphasizes possible time-inconsistent incentives and attendant increased risk taking associated with debt finance. Governments have engaged in bailout of large banks in order to prevent what they believe will be systemic disruption to the entire financial system<sup>2</sup>. While there is a controversy over the extent of systemic risk, it is clear from the experience of the developed economies that the political calculus creates strong pressures to intervene to prevent systemic problems. Combating systemic risk through bailouts is a classic example of what economists call the “time-inconsistency problem”<sup>3</sup>. The time-inconsistency problem arises because it may be socially desirable in the near-term to act to prevent the systemic crises by bailing out troubled banks when faced with the failure of one or more very large banks. However, the likelihood that the government may choose to bailout failing institutions may itself be a causal factor generating high-risk banks and government may not be able to continue the bailout in the long-run.

The above arguments suggest that there may be significant problems in relying exclusively on bank regulations and supervision to monitor and discipline bank risk and thus motivate interests in the use of market agents to complement official efforts.

Nigeria offers an interesting case study for analyzing the effectiveness of market discipline in banks. She has an explicit deposit insurance scheme with several design features that might have increased moral hazard. Since the late 1980s, there has been a wave of financial market liberalization: government substantially divested its shareholdings in banks to private investors through the privatization programme, interest rates have been deregulated, restrictions on the asset choice have been lifted, entries liberalized and greater emphasis placed on capital requirements using BIS standard (Basel Accord I & II). The Universal Banking Act (2001) has enabled banks to engage in an array of activities not hitherto considered by banks. These developments have serious implications for banks’ risk appetites and the role of market or private sector agents in monitoring and controlling them. Further more, uninsured deposits account for more than 70% of total deposit liabilities in Nigerian banks (See Table 2 below) and inter-bank deposits are also a substantial part of these deposits, thus, offering a good testing ground for market discipline. It therefore makes sense to investigate the efficacy of such a programme in Nigerian type environment.

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<sup>2</sup> The case of Nigeria has been that of Too-Many-To-Fail as the regulatory authorities grapple with the insolvencies of too many banks that their liquidation is could precipitate systemic crises.

<sup>3</sup> Acharya and Yorulmazer, (2005) formalize the idea of time-inconsistency of bank regulations in a framework wherein the ex ante and the ex post optimal policies are endogenously derived based on a well-defined objective function of the regulator. They argue that too-many-to-fail problem induces banks to herd ex ante in order to increase the likelihood of being bailed out which in turn leads to too many systemic crises. In other words, the ex post optimal policy is not ex ante optimal.

## 2.0 Performance Statistics of Deposit Money Banks in Nigeria

Table 1 below describes recent trends in average performance indices of deposit money banks in Nigeria. The profitability of deposit money banks in Nigeria has remained fairly stable over the period 1999 to 2003. Average Return on Assets increased from 3.5% in 1999 to 4.1% in 2001 before declining to 3.1% in 2003. Return on Equity followed the same pattern, increasing from 41.4% in 1999 to 50.6% in 2001 before declining to 32.6% in 2003.

**Table 1: Selected Performance Indices for Nigerian Banks 1999-2004**

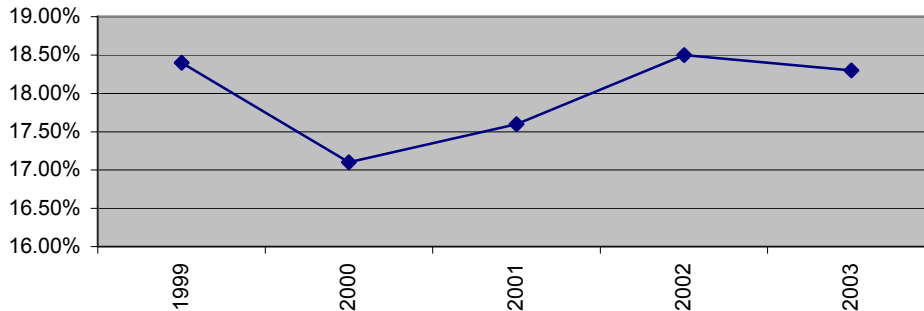
Index	1999	2000	2001	2002	2003	2004
Return on Assets, ROA, (%)	3.5	3.6	4.1	3.4	3.1	2.6
Return on Equity, ROE, (%)	41.4	46.5	50.6	38.4	32.6	27.2
Loan-Deposit Ratio (%)	45.5	43.8	53.6	47.3	51.0	60.2
Demand Deposit-Total Deposit Ratio (%)	58.9	50.6	47.7	46.9	47.2	49.6
Savings Dep.-Total Dep. Ratio (%)	19.9	20.1	19.9	18.0	18.1	18.2
Time Dep.- to Total Dep. Ratio (%)	33.2	29.2	32.3	35.1	34.7	35.1
Nonperforming Loans- Total Loans (%)	24.5	18.2	15.8	23.4	20.7	23.1
Loan loss Prov.- Total Loans (%)	19.5	15.6	15.7	16.8	14.5	15.6
Risk Weighted Assets-Total Assets (%)	46.3	45.0	50.0	50.0	51.4	51.7
Adjusted Capital- Risk Weighted Assets (%)	18.4	17.1	17.6	18.4	18.3	14.6

*Source: NDIC Quarterly Report, various issues*

## 2.1 Capital Adequacy

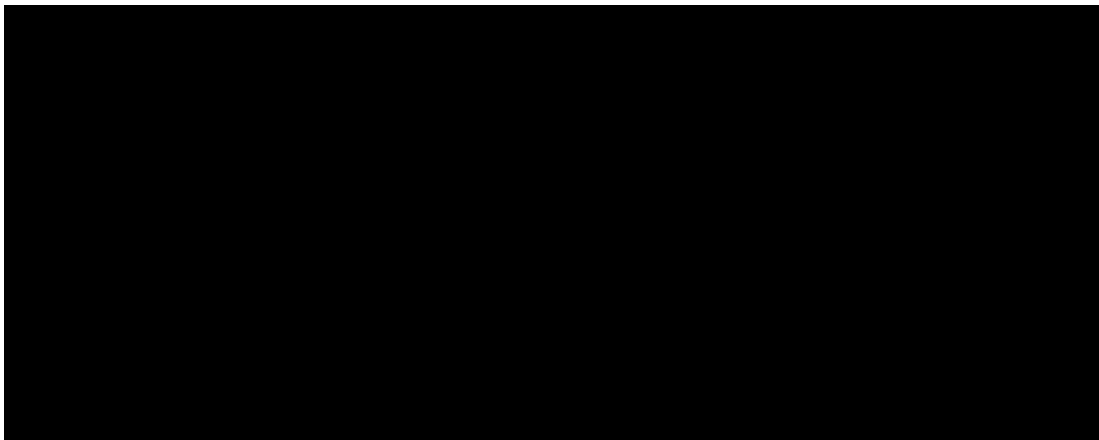
On the average banks exhibited adequate capitalization as indicated by capital to risk weighted asset ratio CRWA. CRWA grew at 18.4% in 1999, 17.6% in 2001 and 18.1 in 2003. At all times, the growth were above the 10% level recommended by the new capital adequacy framework for internationally active banks, which has since become the benchmark for assessing capital adequacy of banks in many countries.

Figure1: Capital - RiskWeighted Asset Ratio of Deposit Money Banks in Nigeria



## 2.2 Asset Quality

On the other hand, the asset quality of deposit money banks is not as impressive. The ratio of non-performing loans to total loans and advances, (NPL), remain high at about 20.7% for most periods of our review. The ratio of loan loss provision to total loans and advances, LLP, declined from 19.5% in 1999 to 15.5% in 2003. In view of the quantum of non-performing loans, this provision is quite inadequate. This is particularly worrisome given the tendency for most banks to understate their non-performing loans as have been discovered by various external auditors. The risk-weighted assets to total assets grew from 46.3% in 1999 to 51.4% in 2003 indicating increased appetite for risks among Nigerian banks.



The establishment of the Nigerian Deposit Insurance Corporation (NDIC) in 1988 heralded the introduction of explicit deposit insurance scheme in Nigeria. The NDIC is responsible for insuring the deposits of all licensed banks and other deposit taking financial institutions licensed by the Central Bank of Nigeria (CBN). The scheme covers all depositors in Nigeria as provided

for in section 20 of the NDIC Act, 1988 (as amended) with the exception of insider deposits, counter claims from persons who maintain both deposit and loan accounts and such other deposits as may be specified from time to time by the Board of the Corporation (Ogunleye 2002). The corporation charges a fixed premium of 15/16 of 1 percent of total deposit liabilities in an institution per annum; the scheme covers a maximum amount of N50, 000.00 for each single account

Table 2 describes some risk characteristics of banks by health. Although the table indicates that the capital-risk weighted asset ratio remained well above the statutory minimum (Basel Accord recommendation), the unsound banks recorded negative capital-risk weighted asset ratios ranging from -36.60 in 2001 to – 146.94, a situation that portrays negative shareholders’ fund for the affected banks.

**Table 2: Bank Performance Indices by Health, 2001 - 2003**

Index	2001			2002			2003		
	Unsound	Marginally Unsound	Industry	Unsound	Marginally Unsound	Industry	Unsound	Marginally Unsound	Industry
Capital – Risk Weighted Assets (CRWA) %	(36.60)	6.38	17.68	(8.87)	13.58	17.75	(148.94)	10.22	14.78
Non-performing Loans- Total Loans & Adv (NPL) %	52.00	18.80	16.90	38.04	26.21	21.27	75.73	16.15	21.59
Average Liquidity Ratio (ALR) %	61.64	53.78	55.55	6.21	61.69	69.15	13.74	46.28	47.40
Gross Loans – Total Deposits (LDR) %	82.62	78.50	71.60	119.27	88.50	76.53	187.16	87.45	85.11
Insured Deposits – Total Deposits (INSD) %	31.26	42.23	31.29	37.91	34.85	27.29	40.46	28.57	24.92
Insider Credits (INSC) Nm	665	9,850	29,850	13,647	5,547	46,773	19,879	2,240	59,591
Adjusted Shareholders’ Fund (Nm)	(9,950)	7,304	183,767	(10,826)	19,278	229,889	(75,660)	10,170	211,112

Source: NDIC Annual Report and Statement of Account, Various issues.

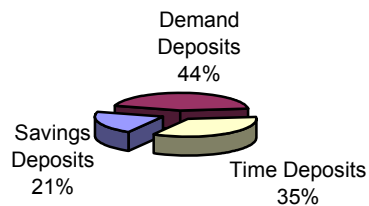
### 2.3 Deposit Structure of Nigerian Banks

Deposits, including uninsured deposits, play vital role as a funding source for banks. In Table 1 above, the proportion of demand deposit to total customer deposits ranged from 46.9% in 1999 to 50.6% in year 2000 before declining to 47.2% in 2003. In the same manner, saving deposits as a percentage of total customer deposits varied between 19.9% in 1999 and 18.1% in 2003. The proportion of time deposits to total customer deposits in banks increased from 29.2% in the year 2000 to 35.1% in 2002 before declining slightly to 34.7% in 2003. This structure has a serious implication for depositor discipline in the country in view of the relative share of time deposits. Time deposits are rate sensitive deposits and almost all funds in this type of deposits are

uninsured since no bank accepts less than N50, 000.00 into this account. More importantly, depositors tend to maintain their savings deposits (which they consider as capital accumulation) in banks perceived to be safe (banks with strong fundamentals). It is therefore expected that depositors,( especially time deposits) should be sensitive to bank risks since their funds are not protected in case of any incident.

Furthermore, in Table 2, the proportion of insured deposits to the total deposit liabilities of all banks never exceeded 37.9% through out the three-year period. This distribution suggests that depositors should be active in monitoring risk activities of their banks since majority of their funds are not protected. The fact that the proportion of insured deposits is higher in unsound and marginally unsound banks may suggest that uninsured depositors discriminate against banks perceived to be unhealthy.

**Chart 1: Deposit Structure of Nigerian Banks (2003)**



### 3.0 Theoretical Literature

Theoretical literature on bank runs is divided between those who stress that depositors may run a perfectly good bank when a bad one in the same system is attacked (and then the bank run is considered a self-fulfilling prophesy), and those who think that depositors can discriminate between good and bad banks (and then the bank run is explained by bank fundamentals). Within the first group, Diamond and Dybvig (1983) present a model in which bank runs are conceived as random events originated in shifts in agents' beliefs. Thus panics are not necessarily related to events in the real economy. In fact bank runs may be a self-fulfilling equilibrium – in a model with multiple equilibria - caused by any event capable of substantially modifying expectations. In order to explain how a run situation is reached, some models explicitly introduce information asymmetries between banks and depositors. Since depositors can not perfectly monitor banks, they use imperfect signals of it to equate their perceptions. These models attempt to identify how agents revise their perceptions about the solvency of banks. In this context, some pieces of news

(e.g. withdrawals in a bank due to genuine liquidity needs) may be interpreted as “bad” signals (i.e. the bank is in trouble and hence causes a massive withdrawal of deposits. That would generate situations where solvent banks close, while other banks survive even though they would not with complete information.

On the other hand, the solvency theory states that crises in the financial sector are a consequence of real shocks and the procyclical behaviour of credits, (Kindleberger, 1978). In the upturn of the cycle, banks tend to strongly extend credits to the real sector and to become highly leveraged. Then, when real shocks get the economy into downturn of the cycle, debtors’ capability to honour their obligations get dramatically reduced. If banks do not have enough reserves to confront this situation, insolvency problems occur. These are the causes of panics. In this context, where bank runs are explained by bank fundamentals, there is a strong argument for providing depositors with adequate information about bank fundamentals.

### **3.1 Corporate Governance and Bank Risk Taking**

In a poor investor protection environment, corporations are run by entrenched insiders who appropriate considerable corporate resources as personal benefits. When these private benefits are large, insiders may undertake sub-optimal conservative investment decision to preserve them. Better investors’ protection reduces these private benefits and may therefore, induce riskier investment decisions. Corporate governance structures in an organization may therefore have serious implications for managerial risk choice in deciding on corporate investment projects. In particular, the managerial compensation structures in an organization may engender managerial risk appetite. It has been demonstrated that stock holders of limited liability banks financed by deposits (whether insured or uninsured), have incentives to take risk beyond that which is optimal for an all equity banks (John, John and Senbet 1991). Capital requirements, prompt corrective actions and risk based deposit insurance premium have formed major policy initiatives of bank regulators to address this issue. John, Saunders and Senbet (2000) have shown several limitations of capital and asset choice regulations following the high leverage of banking firms. In fact capital regulation can only have limited effectiveness in curbing the risk-shifting incentives and indeed ineffective for certain types of investment schedule facing large banks. It is argued that the risk taking incentives of banks arise from limited liability structures and the associated convex pay off of equity holders. This convex payoff can not be removed by risk based deposit insurance premium.

The design of optimal incentive compensation contracts essentially trades-off between different incentive problems and risk sharing considerations. Economic theory of executive pay

has focused on the optimal compensation schemes to align the interest of hired managers to shareholders, (John, Saunders and Senbet 2000; Sierra, Talmor and Wallace 2003; Coles Daniel and Naveen 2004; John, Mehran and Quian 2006). John, Saunders and Senbet (2000) propose a direct and effective mechanism for curbing risk-shifting incentives through exploiting incentive features inherent in bank management compensation structures. This is particularly important because investment risk choice is generally controlled by managers whose risk taking behaviour depends on the structure of their compensation schedule specified by the shareholders. The use of equity-based compensation in the form of stock options has grown so rapidly in recent years. It has been demonstrated that since at certain level of insolvency, equity holders may have incentive to take on higher risks, equity based incentives may not be optimal for reducing banking risks. John, Saunders and Senbet (2000) and Siera, Talmor and Wallace (2003) demonstrate that risk-based compensation structures may be optimal for controlling banking risks. They argue that that the manager of a bank in addition to the fixed salary and a fraction of the equity of the bank should be given a bonus which is increasing in the degree of capitalization of the bank or in the terminal cash flows realized. If the bank is insolvent in the degree of capitalization, the bonus is zero

Analyses of the compensation structures in Nigeria banks tend to follow the traditional theory of aligning management interest with that of the shareholders. Although banks do not publish their compensation structures, a survey carried out for this study indicates that banks adopt different forms of compensation structures. However, stock-based compensation seems to be general as more than 80 % of banks sampled adopt this compensation strategy plus at least one other form of compensation. The survey seeks to find out the executive compensation structures in banks. In particular, the compensation structures for the Chief Executive Officer and other directors were examined. The result of the survey is given in table 3 below.

Table 3: Executive Compensation Structure in Nigerian Banks

Compensation Practice	No. of Banks Practicing	Practice Applicable to		Number of banks in the sample
		CEO	Other Ex. Dir.	
Stock-Based Compensation*	15	15	15	16
Profit Sharing	9	9	9	16
Performance Target- Deposit	12	-	12	16
Performance-Target-Risk based	1	-	1	16
Proportion of Emolument Based on Target	10	2	8	16

Sources: Author's Survey

\* Stock-based compensation includes stock awards, stock option grants and stock appreciation grants.

Table 3 above is the result of executive compensation structure in Nigerian banks based on the author's survey. The survey was carried out in January – February 2007 and therefore, does not

necessarily include the same banks as those in the original sample of the study. After the consolidation/recapitalization exercise that brought down the number of banks from 89 to 25 in December 2005, some banks in the original sample merged with others could not make it and therefore, were liquidated. The survey is therefore based on the surviving 25 banks. While performance-based compensation was introduced, they were mainly done by the so called New Generation banks. Nevertheless, only one bank tied its compensation of Executive directors to risk. The nature of banking business in Nigeria which is essentially retail and entirely tied to deposit generation makes risk based compensation strategy unattractive. Banks rather use deposit targets as a measure of performance and hence the issue of risk sensitivity with respect to compensations down played. However, it is necessary to emphasize that there are other compensation packages, like office perks that are not included in the above survey because of lack of data. Even though, there is no explicit risk based compensation structures, bank managements do consider their total benefits both tangible and intangible while making business decisions.

### **3.2 Market Discipline: A Two-Stage Process of Recognition and Control**

Flannery and Sorescu (1996) discuss how market investors could *recognize and control* the risks of banking firms, which suggest that market discipline must satisfy a two-stage process. The two stages coincide with the two components of *monitoring and influence* identified by Bliss and Flennary (2001) and Hosono (2004). Hamalianen, Hall and Howcroft, (2005) propose a theoretical framework that describes how the implementation of effective market discipline must satisfy the two-phase process termed the recognition phase and the control phase.

### **3.3 The Recognition or Monitoring Stage.**

In the wisdom of Morgan and Stiroh (2000), Hamalianen, Hall and Howcroft, (2005) suggest that effective market discipline requires that investors must first consider themselves to be at risk and, second, that they can effectively observe bank risk<sup>4</sup>. This implies that the recognition phase is made up of two sub-phases, which are crucial to the role of market discipline in bank regulatory design. Proposals that enhance transparency should improve market investors' ability to recognize changes in bank conditions. However, market discipline policies should also incorporate incentive structures that encourage market investors to recognize that they are at risk and, therefore, monitor bank risk-taking.

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<sup>4</sup> Successful market discipline also requires investors to process the information correctly (Crockett 2002) otherwise inaccurate signals will be transmitted to banks.

### **3.4 The Control or Influence Stage.**

This phase also has two sub phases: The first is a natural extension of investor's behaviour from recognition phase, and the second relates to subsequent borrower behaviour. If investors can recognize that they are at increased risk, as a result of bank risk taking, it is reasonable to assume that they will try and control it through either price or quantity effects. However, true risk control depends on whether the borrowers i.e. the banks react to these signals and behave in a manner consistent with their solvency (Hamalainen, 2006). If market discipline is effective, this adjustment in the cost and availability of funds should induce banks to respond, in a manner that reduces the underlying risks. Billett et al (1998) and Jordan (2000) find that, some times, banks reacted to adverse market signals by shifting into less-disciplinary (eg, uninsured deposits) funding sources when problems arise. Therefore, to be effective, the cost of market reaction must be strong enough to offset the effects of banks switching to uninsured and less disciplinary deposit.

The recognition of the different phases within the market discipline arena provides a holistic structure to empirically analyze the effectiveness of market discipline and guide future research on the role of market discipline in bank regulation and secondly, forms the bedrock in formulating a theoretical framework for market discipline. For example, the recognition phase is where rational bank investors consider their funds to be at risk and as a result examine the risks relating to their investments and signal price or quantity effects to the banks. If market discipline is effective, this adjustment in the cost and availability of funds should induce banks to respond, in a manner that reduces the underlying risks. This leads to the control phase, which emphasizes banking institutions response to the signals sent by the investors. If the signals are not strong enough (the penalty of increased costs and unavailability of funds are not sufficient to generate bank response in a manner that reduces bank risks), then, market discipline may have failed.

### **3.5 Some Empirical Evidence of Market Discipline**

Most of the available literature on bank market discipline focuses on the experiences of banks in the United States of America and Europe where this topic, especially as it relates to firm performance has been widely investigated. In these countries, researchers, adopting various approaches, expend considerable efforts in assessing the nature and effectiveness of market discipline. The most widely used approach is the price-based approach which uses yield spreads as a proxy for the market perception of bank risks. The investigation here is whether depositors or investors "punish" banks for risk behaviour by demanding a higher yield spread for holding uninsured bank liabilities. The relation between the quantity of uninsured funds and bank risk was studied by Crabbe and Post (1994). They examine the quantity response of commercial papers

issued by the US bank holding companies (BHCs) to a rating downgrade using a sample of 41 rating down grades in 1986 – 1991 period and find a negative impact of a downgrade on the subsequent CP outstanding. Baer and Brewer (1994), Hannan and Hanweck (1998) and Ellis and Flannery (1992), among others analyze how yields on uninsured deposits respond to banks' risk taking as captured by balance sheet and market measures of risks. The opinion in this circle seems to support the hypothesis that yields on uninsured deposits contain risk premia. Karacadag and Shrivastava (2000); Evanoff and Wall (2000), and Hancock and Kwast (2001) further lent support to this opinion by finding that bank subordinated debt yields are sensitive to bank risks.

Maechler and McDill (2003) adopting quantity approach test whether depositors penalize (discipline) banks for poor performance by withdrawing their deposits in US market. Their finding supports the existence of market discipline: Movements in uninsured deposits is sensitive to bank fundamentals. Peria and Schmukler (1999) examine the banking industry in emerging markets of Argentina, Chile and Mexico to see if market disciplined banks in the 1980 and 1990s. Using a set of bank panel data, they test for the presence of market discipline by studying whether depositors punish risky banks by withdrawing deposits. They find that across countries and across deposit insurance schemes, market discipline exists even among small-insured depositors who punish risky banks by withdrawing their deposits. Barajas and Steiner (2000) examine how depositors choose among different banks over time in Colombia, focusing on whether they discipline bank behaviour. Their panel data estimates for 1985 – 99 show that depositors prefer banks with stronger fundamentals and those banks tend to improve their fundamentals after being punished by depositors.

Gilbert (1990), and Park and Peristiani,(1998) adopt both price and quantity approaches to test the presence of market discipline. They investigate the effects of bank health (proxied by probability of failure) on both the quantity of uninsured deposits and the interest rates paid on these deposits. Their results show that thrifts with higher probabilities of failure (riskier banks) pay higher interests and attract smaller amounts of uninsured deposits.

A study by Billet, Garfinkel and O'Neal (1998), however raise a concern about the effectiveness of depositor discipline. They find that banks whose debts are downgraded by Moody's in America subsequently increase their use of insured deposits. This finding suggest that an increase in the required return on uninsured deposits or the withdrawal of uninsured deposits may have only a limited effects on banks operating decision since banks can turn to the insured deposits for their funding needs. This finding tends to support earlier study by Goldberg and Hudgins (1986) who find failed thrift institutions exhibiting declining proportions of uninsured debts before failure. Jordan (2000) discovers that in New England, troubled banks tend to substitute insured deposits for uninsured ones thereby undermining market discipline. In sharp

contrast, Davenport and McDill (2005) in a micro-level case study of Hamilton Bank failure observe that although uninsured deposits exited at a greater rate than insured deposits, the vast majority of deposits withdrawn were fully insured.

Bliss and Flannery (2002) differentiate between two aspects of market discipline – *monitoring* and *influence*. Monitoring refers to the hypothesis that investors accurately understand changes in a firm's conditions and incorporates those assessments promptly into the firm's debt prices. Influence, on the other hand is the process by which security price changes engender firm (bank) response to counteract adverse changes in firm condition. Although their results identify some patterns consistent with beneficial influences, they couldn't find strong evidence that stock or (especially) bond investors regularly influence managerial actions in US bank holding companies.

Calomiris and Powel (2000) argue further that even if there is evidence that depositors choose banks according to their fundamentals, it does not necessarily follow that market discipline exists. It must also be true that banks are effectively disciplined in that they react appropriately by adjusting their fundamentals in response to signals provided by depositors.

Although studies of market discipline in these countries are vast, there is no consensus as to the nature and effectiveness of market discipline in banking. The situation is even worse in developing economies where studies on market discipline are scanty and where systemic factors seem to play an overriding influence.

Stiglitz and Weiss (1981) point out that market failure in developing countries is pervasive and preponderant (due to information asymmetries in credit market), which implies that market discipline cannot work in these countries. Most practitioners think that as markets do not function in low-income countries, then it must be the case that market discipline does not work. Thus a number of studies highlight the fact that traditional indicators of bank risks tend to become less significant and explain a lower proportion of the total variance in deposit quantities and interest rates during crises periods and during tranquil times and that as a result, the typical test of market discipline tends to fail.

However, Levy-Yeyati et al (2004) note that the failure to find a link between market responses, and the traditional bank fundamentals does not imply the absence of market discipline. First the systemic risks might overshadow the information content of the observed (past) fundamentals as market participants, (such as depositors) react to expected changes in future fundamentals. The traditional fundamentals do not explicitly take into account individual bank's exposure to the systemic factors. In addition, the impending risk of government intervention may prompt depositors to pull out from all banks without distinction. In fact, the failure to observe market discipline in the traditional sense may be an indication that market participants react to

relatively more relevant systemic risk factors, a finding that Levy-Yeyati et al (2004) interpreted as a signal of market discipline, albeit in a broader sense. Barth, Caprio and Levine (2001, 2003) attempt to quantify some of the preconditions for market monitoring using the data from the second (2003) wave of the World Bank's regulatory survey. They proposed an overall "private sector monitoring index", which summarizes the extent to which the private sector is empowered to exercise market discipline. They further observe that this index is higher, the higher the fraction of the banking system that is in local private hands. On the other hand, they failed to find any correlation between market monitoring index and per capita income. Peria and Schmukler, (2001) observe that in developing countries, traumatic events or episodes such as banking crises may act as wake-up calls for depositors, increasing depositors' awareness of the risk of their deposits and thereby triggering off some responses. During crises, banks tend to be weak and the probability of bank failure rises. Thus to avoid losing their funds, depositors tend to increase market discipline during such periods.

Most developing countries have relatively small numbers of banks operating and therefore information on the activities of these banks are easily known and circulated. Consequently, some studies in developing countries tend to be consistent with the existence of market discipline. Some examples include Peria and Schmukler (1999) who find bank deposit volumes varying according to bank risk behaviour in Argentina, Chile and Mexico. Barajas and Steiner (2000) find that banks with strong fundamentals in Colombia benefited from lower deposit interest rates and higher lending rates and therefore conclude that market discipline works, Calomiris and Powell (2001) find that the volume of deposits are sensitive to bank risks in Argentina.

In Nigeria, available literature have addressed issues like bank distress and performance including the impacts of such government policies like use of stabilization securities on bank performance and bank health. Adekanye (1993) represents one of the pioneering attempts at investigating the financial conditions of Nigerian banks. Using Multivariate Discriminant Analysis (MDA) Adekanye develops early warning models for bank financial distress. He observes that the major source of problems for Nigerian banks derives from management ineptitude. Other studies that attempt to develop early warning models for Nigerian banks are Nyong (1995) and Sobodu and Akiode (1996) who both use binary logit regression to develop early warning models for Nigerian banks. They identify management quality, policy variables and corporate control mechanism as the major predictors of failure in Nigerian banks.

Sobodu and Akiode (1994) employ Data Envelopment Analysis (DEA) to study the efficiencies of banking institutions in Nigeria under the privatization policy. The study show that the efficiency of the Nigerian banking system declined significantly during periods of financial

deregulation compared to its levels before deregulation. They also discover that privately owned banks operate more efficiently than government owned banks. Soyibo *et al* (1996) study the effectiveness of banking supervision in Nigeria and Beck, Cull and Jerome (2005) assess the effects of privatization on performance in a panel of Nigerian banks. They find evidence of performance improvement on nine banks that were privatized. Their results also indicate evidence of decreasing financial intermediation over the 1990s: banks that focused on investment in government bonds and non-lending activities enjoyed a relatively higher performance. Perhaps, the most notable attempt at analyzing the risk behaviour of Nigerian banks is Sobodu (1998) who study risk-taking and distress in Nigerian banks. Using various measures of risks, she links bank financial distress in Nigeria to risk behaviour of banks.

Although the various contributions of these studies are commendable, having immensely enriched our understanding of bank financial condition in Nigeria, the impact of some policy measures, management and other variables on bank performance and behaviour etc, the role of private sector agents in monitoring and controlling bank risk behaviour has largely not been explored. In view of the increasing attention on the possibility of using market agents to complement official supervision and regulations in both global and local banking markets, there is the need to extend the research further to incorporate this topical issue. This is what this study attempts to achieve.

#### **4.0 Methodology**

In this section, we show our methodology for an empirical determination of the effectiveness of market discipline. Empirical literature on market discipline has shown two distinct approaches to study market responses to bank fundamentals. The most widely used approach is the price-based approach which uses yield spreads as a proxy for the market perception of bank risks. The investigation here is whether depositors or investors “punish” banks for risk behaviour by demanding a higher yield spread for holding uninsured bank liabilities. Baer and Brewer (1994), Hannan and Hanweck (1998) and Ellis and Flannery (1992), among others analyze how yields on uninsured deposits respond to bank risk taking as captured by balance sheet and market measures of risks. Karacadag and Shrivastava (2000); Evanoff and Wall (2000), and Hancock and Kwast (2001) test whether subordinated debt yields are sensitive to bank risks. The second approach called the quantity approach tests whether depositors discipline banks by withdrawing their deposits from such banks. In this study we shall adopt a variant of the two approaches called the Price-Quantity approach. Following this framework, depositors acting as principal to the bank discipline banks for excessive risk taking by either demanding higher yields on their deposits and/or withdrawing such deposits completely from the bank.

To evaluate the effectiveness of market discipline, we estimate two sets of model that reflect the two stages approach to market discipline as required by theory. In the first model, we test whether bank insolvency risk (proxied by bank fundamentals and other risk characteristics), significantly explain deposit growth and changes in interest on the deposits. In the second model, (second phase of market discipline), we specify a bank response model that tests whether banks respond to the signals sent by the market by limiting their risks.

#### 4.1 Market/Depositor Monitoring of bank risk<sup>5</sup>

To estimate interest and deposit responses to bank risks, we follow two distinct steps. As developed by Park and Peristiani (1998), there are two ways in which market discipline (more correctly, market monitoring) may be tested in the market for deposits: through price (the interest rates) and through quantities (level or growth of deposits):

$$R_{it} = \beta_0 + \beta_1 P_{t-1i} + \beta_2 Z_{it} + \varepsilon_{it} \quad 1$$

$$D_{it} = \lambda_0 + \lambda_1 p_{t+1i} + \lambda_2 W_{it} + \omega_{it} \quad 2$$

The variable R and D represent the deposit interest rate and the level of deposit respectively, the subscripts t and i denote the time and individual bank dimensions respectively, p is the expected probability of default or failure of bank i. It represents the risk or expected loss assumed by depositors. The equations include vectors of other control variables, which may have effects on deposit interest rates (Z) or on the level or growth of deposits (W).

Equation 1 and 2 test for the existence of market discipline by testing for the significance of  $\beta$  and / or  $\lambda$ . If depositors demand a higher interest rate from banks with higher probability of failure (i.e. higher risk), then  $\beta$  will be positive and significant and one may conclude that depositors are exerting discipline over banks. Likewise, if depositors tend to place fewer deposits with riskier banks, then,  $\lambda$  will should be negative and significant.

However, two issues arise in the specifications 1 and 2 above. First, there is the problem of how to measure the probability of default, p. Park and Peristiani follow a two step procedure, estimating this probability using a logit model as a function of bank performance indicators or fundamentals (percentage of bad loans, profitability, equity ratios, portfolio compositions, operational costs among others), and using the estimated probability directly as explanatory variables in equations 1 And 2. While this procedure appears to be attractive, it may not always

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<sup>5</sup> This section draws heavily from Barajas and Steiner (2000).

be possible to estimate the probability accurately, especially in a period when there are not many actual observations of failures. More importantly, Peria and Schmukler (1999), point out that by including the probability of default directly, it is not possible to determine which of the bank indicators may be providing the strongest signal to depositors that banks are in fact taking on higher risks. Therefore it may be more informative to include the bank fundamentals themselves as explanatory variables in the market monitoring equations (equations 1 & 2) and to test for market discipline by testing their individual or joint significance. Many scholars have adopted this approach. For example, Barajas and Steiner, (2000) use non-performing loans to total loans ratio, non-performing loans to asset ratio, loan loss provisions to asset ratio, capital asset ratio, return on equity, and liquidity (proxied by total reserve to asset ratio) as bank fundamentals. Calomiris and Powell (2000) include lagged capital ratios, loan interest rates, loan to other asset ratios, percentage of non-performing loans, while Maechler and McDill (2003) include return on assets, equity ratio, percentage of residential loans and percentage of non-performing loans as bank fundamentals.

A second specification issue is what to include as control variables Z and W which are expected to exert influence on depositor behaviour. Park and Peristiani (1998) include two macro variables indicating the overall size of the market (state-wide deposit growth), bank-specific controls relating to market share and size (total assets) and a number of regulatory dummy variables. Demirguc-Kunt and Huizinga (1999), include two controls in their individual country estimation: bank overheads (the non-interest costs to asset ratio) and size (deflated by the GDP deflator). Peria and schmukler (1999) include two sets of controls: systemic and macroeconomic variables both of which vary over time but not across individual banks<sup>6</sup>. Calomiris and Powell include ratio of cash to Government bond and find the variable significant.

The major concern about the specification used by the above studies is that while they may control for the effects of economy wide factors, they do not incorporate additional individual bank variables that should play a key role, in particular, the return to deposits. While risk is particularly accounted for by the bank fundamental variables (reflecting the probability of default) the tests do not incorporate the return to depositors nor do they incorporate non-fundamental variables that may reflect perceived risk to depositors. We include returns to depositors in a broad sense, encompassing both direct financial returns (interest rate) as well as benefits in terms of easing transaction costs to the extent that bank deposits are used for payment purposes. Therefore, a full specification of deposit demand should incorporate these as well as

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<sup>6</sup> The systemic variable was the cash (outside banks) to deposit ratio capturing overall preference for bank deposits; and the macroeconomic variables were the ration of international reserves to M2, the stock market index, and the external interest rate differentials.

non-fundamental variables related to perceived risk. Apart from serving as additional control variables, these variables provide alternative hypothesis regarding depositor behaviour in the absence of market discipline. That is, if market discipline is rejected – all bank specific variables do not explain deposit levels – they will serve as explanations as to why depositors choose one bank over another or why deposits may grow more rapidly in one type of bank than in another.

We therefore specify the market monitoring equations by incorporating the return variable  $r$  and the non-fundamental risk variables  $Y$  in addition to the fundamental variables (FUND) and macro variables  $Z$

$$R_{it} = \beta_0 + \beta_1 FUND_{it} + \beta_2 Z_{it} + \beta_3 Y + \beta_4 COB + \varepsilon_{it} \quad 3$$

$$D_{it} = \lambda_0 + \lambda_1 FUND_{t-1i} + \lambda_2 Z_{it} + \lambda_3 Y + \lambda_4 r + \lambda_5 COB + \omega_{it} \quad 4$$

Where  $R_{it}$  and  $D_{it}$  are the interest rate charged on deposits and deposit growth in bank  $i$  at time  $t$ , We determine interest rates implicitly by dividing the interest expenses by the total deposit liabilities for the total deposit equation and dividing interest expenses on a category of deposit by the average stock of the deposit category in end of each period<sup>7</sup>. FUND is a vector of bank financial soundness indicators related to their risk. This variable is included with a lag in the deposit growth equation to account for the fact that balance sheet information is available to the public with a certain delay.  $Y$  is a vector of non-fundamental risk variables,  $Z$  is a vector of macroeconomic variables in the equations,  $r$  is a vector of return variables. The macroeconomic variables and some other systemic variables may change over time but not across banks. We use growth in deposits rather than the level of deposits. The choice of this variable is informed by the fact that we are not interested in explaining the different sizes of bank level deposits nor differences in funding strategies (deposits/total liabilities), rather our variable of interest is related to how depositors' perceptions of risk and return changes and hence how deposits change.

The fundamental variables are meant to capture the three aspects of banking risks, credit risk as measured by asset quality presented as the ratio of non-performing loans to total loans and advances, and provision for non-performing loans; insolvency risk (capital risk) measured by the ratio of qualified capital to risk-weighted assets; and liquidity risk measured as the ratio of total loans and advances to total deposit liabilities of the bank. In addition to the risk factors, we add a measure of profitability of the bank. Although this ratio does not measure risk per say, it is widely

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<sup>7</sup> The reason for using implicit interest rate here is obvious: In the first place, banks do not pay a single interest rate. Indeed on any particular day banks offer a multitude of rates depending on classes of customers and the type of product the bank supplies.

used, together with capital ratio, by the banking public in Nigeria as evidence of bank soundness and has been relied on for assessing bank probability of default.

$NPL = \text{non-performing loans} / \text{total loans \& advances}$

$CAP = \text{shareholders' fund} / \text{risk weighted assets}$

$PROV = \text{loan loss provisions} / \text{total loans and advances}$

$LIQ = \text{total loans and advances} / \text{total deposit liabilities}$

$ROA = \text{Return on Assets}$

Y which is a vector of non-fundamental risk variables is made up of ownership and size. For the ownership, we include two dummy variables, (STATE), which takes on the value 1 if a bank is a state owned bank and zero otherwise; and a second dummy, FOREIGN) which takes on the value 1 if a bank is foreign owned and zero otherwise. A bank is considered state owned if state has a controlling shareholding in the bank. In the same vein a bank is considered foreign bank if the controlling shareholdings belong to foreigners. The conventional wisdom is that most developing countries depositors are less concerned about individual bank risks since vital information to aid them in monitoring banks are not available at least in a timely manner. They therefore follow systemic indicators rather than individual bank risk characteristics. We therefore introduce variable capture this events. One such variable is the ratio of cash outside banks to the total banking industry deposits (COB). This variable is meant to capture the degree to which the overall public confidence on the banking system rather than individual bank risk characteristics influences deposits. Z is a vector of macroeconomic variables made up of growth rate of real gross domestic product, (RGDP), inflation (INF) and All Shares Price Index of Nigerian Stock Exchange (ASI). ASI measures stock market returns and may also offer alternative explanations for deposit growth.

Based on the analytical framework discussed above, we test whether depositors react to changes in bank fundamentals. In particular, if depositors are concerned about bank risk and respond rationally to these risks, then deposit growth should be negatively related to asset quality (NPL), and liquidity (LIQ), and positively related to capital adequacy, (CAP), and provision coverage (PROV) . In the same manner interest rates should be positively related to asset risk (NPL), liquidity risk, (LIQ) and negatively related to capitalization ratio, (CAP), provisions coverage, (PROV). In the case of return on assets (ROA), if other variables control for risk, then higher ROA should imply less risk and hence for market discipline, we would expect a negative coefficient in the first equation and a positive coefficient for the second equation. Actually, ROA as a measure of profitability does not capture bank risk but this variable together with capital ratio is a major variable that captures the interest of Nigerian banking public in assessing the health status of their banks. For the deposit growth equation only, the bank fundamental variables are all

lagged once to control for the fact that information on these data are available to the public only with a lag.

To capture the return to depositors, we include the interest paid on the deposits,  $r$  (bank specific) in the deposit growth equation only. We measure the interest rate implicitly from the balance sheets and income statements, as the ratio of interest paid to the average stock of deposits at the end of each period. It is expected that the return variable ( $r$ ) should be positively correlated to deposit growth. The second return variable is bank transaction services. We use the number of branch offices (BRANCH) as proxy for the level of bank transaction services. We expect the number of branches to reflect the quality of payment services offered by a bank. Deposits should grow faster in banks with lower transaction costs or offer more payment services by providing more branches. It is further expected that banks with more branch networks will attract deposits at lower interest rates than banks that just have fewer branches. This is because the banks with more branch networks have lower transaction costs compared to banks with just few branch networks. As for the non-fundamental risk factors, we include dummy variable for the state ownership (STATE) to test whether depositors perceive state-owned banks are more likely to be bailed out another dummy for foreign ownership, (FOREIGN) to test whether these banks possess any advantage in terms of reputation over their domestic counterparts. We also control for bank size (Log Assets), proxied by log of total assets, to test whether depositors respond to a too-big-to-fail effects or whether there is a flight to quality. The variable Log Assets is expected to be positively related to deposits growth in a bank and negatively related to deposit interest rates. Finally, deposits at individual banks or the price of deposits may also be influenced by the state of the overall economy. Thus we control for the effects of macroeconomic shocks that affect all banks equally. In particular, we evaluate the effects of growth in real Gross Domestic Product (RGDP), and inflation rate measured as changes in consumer price index, (INF). These variables reflect the relative strength of the economy. If the economy grows, the fortunes of banking public will improve and therefore, it is expected that higher economic growth will be positively associated with deposit growth and negatively related to the prices of deposits. In the same manner, higher inflation means lower real returns to deposits. At high inflation periods, people tend to save less and therefore growth in deposits will be less and interest rates on deposits will be higher to compensate for the loss in real value of the deposits. All shares Index capture returns in an alternative investment, the stock market. It is expected that the higher the returns, the more likely that investors will prefer to invest their investible funds in stocks instead of keeping them at the banks. Deposit growth and interest rates will therefore be negatively related and positively related to COB respectively.

#### 4.2: Bank Response Model.

Whether deposit growth and deposit interest rates are sensitive to bank risk characteristics is only the first and necessary condition in determining whether market discipline is effective. A second and sufficient condition involves understanding whether banks respond positively to the signals provided by depositors. The question is whether or not risk pricing would actually deter banks from taking risks they would otherwise not take. In other words, does the signal sent by the depositors actually constrain bank risks? Bliss and Flannery attempt to answer this exact question by making a clear distinction between monitoring and influence by debt holders but fail to find any evidence that the market influence bank behaviour. Calomiris and Powell (2000), explore this issue by testing whether there is tendency for individual bank's deposit rates to revert to their mean, behaviour consistent with market discipline. This indirect test assumes that if banks are forced to increase their interest rates due to depositors' actions, and they feel disciplined, banks will reduce their risk taking and consequently interest rates will revert to their means. They not only accept the hypothesis of mean reversion for Argentina but also provide evidence that the speed at which interest rates revert to their mean has increased, which they attribute to improvement in accounting and supervision standard.

Adam Ashcraft (2006) examines this question by comparing across mix of debt in regulatory capital, the ability of financially distressed banks to recover. They find that the amount of subordinated debt in the regulatory capital has an important positive effect on distressed bank's ability to recover and has a strong effect in preventing future financial distress.

Although Adam and Ashcraft (2006) approach is appealing, Nigerian banks do not issue subordinated debts and so the issues of capital mix in this context do not arise.

We therefore adopt the Calomiris and Powel (2000)'s approach of mean reversion. Here, we examine whether there is a tendency for individual banks deposit interest rates to revert to their mean and whether the speed of mean reversion has changed over time. If market discipline compels banks to react to increase in their insolvency risks, then high levels of insolvency risks should prompt reduction in interest rates in the future. We test this hypothesis using time series properties of individual banks' interest rates.

The specification used to model the time properties of the banks' interest rates is:

$$(R_{it} - R_{it-1}) = \pi + \alpha R_{it-1} + \beta_i + f_t + \varepsilon_{it} \quad (5)$$

Where  $R_{it}$  is the deposit interest rate paid by bank  $i$  on quarter  $t$ ,  $\beta_i$  and  $f_t$  are fixed and time effects respectively, and  $\varepsilon_{it}$  is an error term. The  $i$  and  $t$  subscripts refer to individual bank and time respectively.

This is equal to testing for:

$$R_{it} = \pi + (1 + \alpha)R_{it-1} + \beta_i + f_i + \varepsilon_{it} \quad (6)$$

The coefficient  $\alpha$  which represents the speed of mean reversion is therefore expected to be negative. If interest rates reverts by 100% in just one period, then we expect the  $\alpha$  coefficient to be  $-1$  whereas if there is no reversion at all then we expect the  $\alpha$  to be zero in the equation (6) above.

### 4.3 Estimation Procedure and Data Requirements

We use ordinary least squares to estimate equations (3) and (4) specified above. Since the equations are specified independently, the OLS technique will be most appropriate because of the BLUE properties of the OLS estimators. The test of market discipline involves testing whether the parameter estimates, as represented by the  $\beta$ s *and* the  $\lambda$ s are individually or jointly different from zero. We shall estimate various versions of equation (3) and (4). First we distinguish among different measures of deposits as in Growth in total deposits, Growth in Time deposits and Growth in Inter-bank deposits. This distinction is important because, a priori, we expect to find differences in the degrees of market discipline across these deposit groups. This is to enable us find which type of deposit is most sensitive to bank risks and to assess whether insured deposits also react to bank risk characteristics. This idea becomes necessary in view of the fact that sometimes deposit insurance scheme may not be credible or that there are fears of substantial cost of having funds trapped in failing banks through payment uncertainty and delays. This fear is very realistic in Nigeria where some failed banks depositors are yet to get their funds due to delays occasioned by litigations. For the deposit growth equations only, the bank fundamental variables are lagged once to control for the fact that information on these variables are available to the banking public only with a lag. Since the real GDP series is available only on annual basis, we need to convert them to quarterly series to correspond to other variables in the model. For this purpose we use a method of interpolation called the “quadric-match-sum”, usually applied to flow variables, to generate quarterly series.

We estimate a pooled sample to determine whether deposit growths are sensitive to bank risk characteristics. The decision rule here is whether the parameter estimates are individually or collectively significant. Then, the sample is divided into two based on their health status. The idea is to investigate whether differences in deposit growth and deposit interest rates reflect differences in bank’s risk characteristics. We define healthy banks as banks whose capital asset ratio is equal or more than the regulatory minimum and/or whose ration of nonperforming loans to total loans and advances is above the median levels for all banks in a sample period. All other ones are regarded as unhealthy banks.

Furthermore, using equations (3) and (4), we divide the sample periods to test for the presence of market discipline, before, during and after banking crises. The period of banking crises has been identified to be 1997 – 1999. This is the period that 26 banks (13 commercial and 13 merchant banks) were liquidated at the same time. Banking crises episodes are unique periods to examine market discipline. First during crises, there are large aggregate shocks to the economy and to the banking sector. Also bank interventions, typical of crises, temporarily immobilize deposits and interest rates. The risks of bank failure and of losing deposits, temporarily or permanently, become more evident during crises and this may act as a wake up call for depositor. This exercise will assist us analyze whether the responsiveness of depositors to risk taking is affected by banking crises.

In order to ascertain the joint significance of the bank specific variables, we report the corresponding F-Statistic. This enables us to determine the joint significant impacts of these variables on deposits even when some of them might not be individually significant.

Equation (6) is a dynamic process and estimating dynamic models that includes lags of the dependent variable in the explanatory part of the models is not as straight forward as linear models for continuous dependent variable. The OLS estimator no longer produces unbiased and consistent estimates of the parameters, although they are inefficient. That is, the OLS estimates are inconsistent, and are biased upwards asymptotically. To account for this dynamism, we use the generalized-method-of-moments (GMM) estimator developed by Arellano and Bond (1991) for dynamic panel data. This generation of GMM models has the marked advantage that it specifically designed to handle autoregressive properties in the dependent variable (interest rate) and the endogeneity issues between the dependent variable and the explanatory variable (lagged interest rates) . In any case, we compare the distribution of the estimated  $\alpha$  coefficients (across banks) for different sub-periods.

Our sample comprises all banks that operated within the study period for which data is available. Accounting ratios for individual banks are built up using the supervisory reports that banks are required to submit to the Central Bank of Nigeria on monthly and quarterly basis. In general, most of the bank specific and the macroeconomic indicators are available at annual frequencies over a long time span. However, bank specific indicators became available for monthly and quarterly frequencies only from 1995 when the CBN introduced the Banking Analysis System (BAS). Because the paper focuses on market monitoring which is an ex ante analysis, higher frequency of observations is preferred to long time span of the study. The analysis therefore uses quarterly observations and covers the period 1995Q1 to 2004Q4. A total of sixty six (63) banks amounting to 2,520 quarterly bank observations were included in the sample

Table 4 Descriptive Statistics of some fundamental variables used in the Regression

Variable	1995 - 2004		1995 - 1997		1998 - 1999		2000 - 2004	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Total Assets (N'm)	20,975	20,560	8,932	6,211	35,270	20,155	55,902	33,622
Totoal Deposits (N'm)	15,210	14,290	5,783	3450	17,200	5,300	30,079	17500
Profit B/4 Tax N'm	350	220	156,	97	520	200	1,020	530
Total Loans/Adv.N'm	10,500	8240	2,814	1,315	13,200	5,200	13,644	9,212
Non-perm. Loans N'm	4,125	6,679	564	700	9,271	10,002	5,073	10,284
Loan loss ProvisionsN'm	840	780	504	322	650	491	2,255	950
Int. Expenses	284	295	299	231	420	491	1,626	2,051
Capital/RW-Aassets (%)	12.5	8.5	17	9	10.1	6.2	18.7	10.5
Loan/Deposits (%)	54.3	60.4	56.7	58.5	69.3	75.1	58.0	61.2
Non-Perfm. Loans/Total Loans (%)	24.7	19.3	17.1	19.2	27.2	35.1	28.7	30.5
Loan loss prov./Non-perform loans (%)	14.5	14.9	15.5	10.1	13.5	9.4	14.9	13.2
ROA (%)	2.3	1.9	3.2	0.9	1.3	0.9	3.3	1.7

Source: Author's calculations

Table 4 above provides summary statistics for our measures of bank asset risk, capital adequacy ratio liquidity deposit growth and interest expenses. These are provided for separate sub-periods and for the entire period of the study. The main usefulness of this table is to indicate the extent of heterogeneity in the reactions of markets to banks (deposit growth and deposit interest rates) and describe the average changes over time in measures of asst risk capitalization, liquidity and deposit growth.

## **5.0 Empirical Results**

The results of our estimations are presented in two parts. The first part presents the results of market monitoring behaviour of deposits as reflected in the deposit growth and deposit interest rate responses to changing bank fundamentals, while the second part discusses the results of market influence, as reflected in the dynamic response of banks to the disciplining signals sent by depositors depicted in the first part.

### **5.1 Market Monitoring.**

This section examines the responsiveness of deposits to bank risk taking. The regression estimates for the deposit growth equations are reported in Table 5 below. Here we used three measures of deposits as in Total Deposit, Time Deposits and Inter-bank Deposits. With respect to Total deposit, although bank capitalization is the only significant fundamental, all other fundamental variables though not significant but have correct signs. For Time deposits, bank capitalization (CAP), and profitability (ROA) are positive and significantly showing that greater capitalization and profitability are associated with higher deposit growth. Asset quality (NPL) and liquidity (LIQ) though correctly signed, both are not significant. For the inter-bank equation, all the three fundamental variables are significant and properly signed indicating that inter-bank deposits are sensitive to both capitalization and the quality of assets. It is however, pertinent to note that asset quality is not significant for the deposit equations except for the inter-bank deposit growth equation.

Deposit growth responds positively but not significantly to interest rates ( $R_{i,t}$ ) indicating that although depositors are mindful of interest rates while making choice among banks, returns to deposits is not necessarily a significant determinant of bank choice. However, the number of branches, (BRANCHES), is positive and significant showing that transaction services are important factors in depositor's choice among banks. Again, we note here that the return variable  $r$  is not significant for all categories of deposits. The size variable, turn out to be positive and significant in all the deposit equations suggesting behaviour consistent with the too-big-to-fail and the flight to quality doctrines.

Table 5: Result of Panel Regression for Deposit Growth

Variable	Dependent Variable: Growth in Deposits		
	Total Deposit	Time Deposit	Inter-bank Deposit
Constan	0.122 (4.552)	<b>-0.439</b> (7.451)	<b>-1.631</b> (6.314)
NPL <sub>t-1</sub>	<b>-0.206</b> (0.251)	<b>-0.149</b> (-0.665)	<b>-0.302**</b> (2.984)
PROV <sub>t-1</sub>	<b>0.002</b> (0.001)	<b>0.002</b> (0.002)	<b>0.232**</b> (2.388)
CAPt-1	<b>0.391**</b> (2.974)	<b>0.326**</b> (2.145)	<b>0.411**</b> (3.587)
ROA <sub>t-1</sub>	<b>0.371</b> (.550)	<b>0.393**</b> (3.115)	<b>0.011</b> (0.012)
LIQ <sub>t-1</sub>	<b>-0.024</b> (0.196)	<b>-0.018</b> (0.557)	<b>-0.158*</b> (1.011)
r	<b>0.001</b> (0.005)	<b>0.184</b> (0.774)	<b>-0.240</b> (0.924)
BRANCH	<b>0.344**</b> (2.584)	<b>0.284**</b> (2.795)	<b>0.150</b> (0.101)
STATE	<b>0.022</b> (0.401)	<b>0.024</b> (0.550)	<b>0.001</b> (0.001)
FOREIGN	<b>0.007</b> (0.038)	<b>0.001</b> (0.014)	<b>0.001</b> (0.009)
COB	<b>-0.210***</b> (8.451)	<b>-0.207***</b> (7.220)	<b>-0.101</b> (0.011)
Log Assets	<b>0.498***</b> (15.20)	<b>0.221***</b> (7.249)	<b>0.191*</b> (2.423)
RGDP	<b>0.311***</b> (15.256)	<b>0.261***</b> (8.120)	<b>0.203**</b> (4.112)
INF	<b>-0.101***</b> (2.59)	<b>0.115***</b> (2.335)	<b>0.021</b> (0.122)
ASI	<b>-0.175***</b> (3.75)	<b>-0.267***</b> (9.45)	<b>0.015</b> (0.110)
Adj. R <sup>2</sup>	0.656	0.780	0.430
F-Statistic	17.95	19.63	10.20
No. of Obsvs	2,514	2,514	2,514
No. of Banks	63	63	63

\* signifies at 10% level of significance, \*\* signifies 5 % level of significance and \*\*\* 1 % level of significance.  
Numbers in parenthesis are t-statistics

With respect to dummy variables that account for ownership, whether banks are foreign or domestically owned seem to have no effects in deposit growth of a bank. Thus, contrary to the general belief, foreign banks do not possess the reputation advantage in attracting deposits. In the same vein, whether a bank is state or privately owned has no effects on deposit growth as the dummy variable STATE fail to significantly affect any of the deposit growth equations. The variable COB which accounts for the public confidence in the entire system is negative and

highly significant indicating that this variable significantly influences deposit growth in banks. All the variables controlling for the macroeconomic environment, appear significant for all categories of deposit except INF which is not significant for Inter-bank deposit only.

Table 6: Result of Panel Regression for Deposit Interest Rates

Variable	Dependent Variable: Interest Rates on Deposits		
	Interest Rate on Savings Deposit	Interest Rate on Time Deposit	Interest Rate on Inter-bank Deposit
Constant	<b>-0.039</b> (5.3664)	0.196 (7.901)	.721 (6.4319)
NPL	<b>0.025</b> (0.511)	<b>0.081</b> (0.936)	<b>0.504***</b> (5.622)
PROV	<b>0.178</b> (0.325)	<b>0.001</b> (0.724)	<b>0.154</b> (1.927)
CAP	<b>-0.479***</b> (4.221)	<b>-0.215***</b> (2.922)	<b>-0.314**</b> (4.012)
ROA	<b>0.015</b> (0.360)	<b>0.045</b> (0.111)	<b>0.008</b> (0.066)
LIQ	<b>0.134</b> (0.611)	<b>0.133***</b> (3.679)	<b>0.107**</b> (2.397)
BRANCH	<b>-0.002</b> (0.158)	<b>-0.019</b> (0.211)	<b>-0.011</b> (0.012)
STATE	<b>0.072</b> (0.325)	<b>0.009</b> (0.003)	<b>0.001</b> (0.031)
FOREIGN	<b>0.019</b> (0.24)	<b>0.177</b> (1.287)	<b>-0.045</b> (0.523)
Log Assets	<b>-0.211*</b> (2.781)	<b>-0.244*</b> (2.555)	<b>0.022</b> (0.143)
RGDP	<b>0.247**</b> (3.484)	<b>0.281**</b> (2.992)	<b>0.142**</b> (3.112)
COB	<b>0.024</b> (0.055)	<b>0.252**</b> (2.940)	<b>0.019</b> (0.950)
INF	<b>0.392**</b> (2.457)	<b>0.399**</b> (3.244)	<b>0.299**</b> (3.354)
ASI	<b>0.010</b> (0.014)	<b>0.285**</b> (2.985)	<b>0.007</b> (0.024)
Adj. R – Squared	<b>0.495</b>	<b>0.580</b>	<b>0.649</b>
F – Statistic	<b>11.25</b>	<b>7.50</b>	<b>10.22</b>
No. of Obs.	<b>2,514</b>	<b>2,514</b>	<b>2,514</b>
No. of Banks	<b>63</b>	<b>63</b>	<b>63</b>

\* signifies at 10% level of significance, \*\* signifies 5 % level of significance and \*\*\* 1 % level of significance.  
Numbers in Parenthesis are t-statistics

In addition to the deposit growth equation, we estimate interest rate equations to provide alternative explanations for market discipline. In the analytical framework, we argue that apart from the quantity channel, depositors could use price or interest rate as a means of exercising discipline on banks. It could well be that as the insolvency risk increases we do not observe a

decline in the rate of growth of deposits only because banks compensate for increased risks by paying higher interest rates on deposits. That being the case, depositors should discipline banks by demanding higher yields in the form of interest rates on such deposits. With respect to interest rate equations, the effects of fundamental variables are less obvious. Only the bank capitalization variable is significant across board. However, interest on inter-bank deposits responds positively and significantly to asset quality, non-performing assets and the liquidity positions of banks. The results imply that well capitalized banks are able to attract all categories of deposits at reduced interest rates compared to their poorly capitalized counterparts. Also, banks that are cash constrained by way of low liquidity tend to pay higher interest rates on interbank deposits than others. Inter-bank deposits rates seem to be more responsive to bank fundamentals than other categories of deposits. This is not surprising in view of the fact that banks have relative information advantage on other banks' risk characteristics than other private depositors. In general, it can be observed that not all fundamental variables behave in a way that is consistent with market discipline. While variables like bank capitalization, asset quality and liquidity exhibit behaviour consistent with market discipline, other variables are not significantly affecting deposit interest rates. Nevertheless, it is also pertinent to point out that one should not necessarily expect to observe both a fall in deposits and a rise in interest rates at the same time. In fact, since we have shown that market monitoring is not rejected for a key subset of the fundamental variables in the deposit growth equation, we need not observe any particular relationship between the interest rates and these fundamentals as all market discipline may be operating through the quantity channel.

It also appears that large banks are able to attract deposits (especially savings and time deposits) at reduced prices. This goes further to support the too-big-to-fail and the flight to quality doctrines in bank deposit market. With respect to the control variables, the number of branch offices do not significantly affects interest rates. This is rather expected since this variable is a proxy for bank transaction services that might substitute for higher interest rates. The variables representing ownership in banks do not have any significant effect on interest rates, as none of them are significant in the regression. As expected the macroeconomic variables continue to be significant and properly signed. It is however surprising that the variable representing public confidence in the system (COB) is not significant safe for the Time deposit equation. This goes further to support the fact that banks interest rates do not respond to public perception as seen in the results of bank response equations.

## **5.2 Market Discipline and Banking Crises.**

Banking crises are unique episodes to examine market discipline. The risks of bank failures and of losing deposits become more evident and are even magnified during this period. In

many cases, banks actually fail and deposits are lost or frozen. It has been argued that crises period act as a wake-up calls for depositors who might hitherto not be active in monitoring their banks. This section tries to examine this proposition by testing the strength of market discipline before, during and after the crises period. We examine the relative importance of bank fundamentals within and outside bank crises periods by checking their magnitude and significance within some identified periods of crises and tranquility. In this analysis, we identify the period 1998 and 1999 as the period of banking crises. Although it has been argued that Nigeria has had banking crises spread for a very long time, 1998 was the period that 26 banks were liquidated at once for their technical insolvencies. It may be appropriate to regard this as the period of crises in view of the fact that banking crises (failure) of this magnitude has not occurred in any particular year in the history of Nigerian banking.

Table 7 below shows the regression results for the three sub-periods. Deposit growth and interest rate equations were estimated for the three periods and the magnitude and significance of the fundamental variables compared. Even though the signs were omitted, the fundamental variables are lagged once for the deposit growth equations only. For the pre-crisis periods, (column 2 & 3 of table 7), although all the fundamental variables continue to exhibit appropriate signs, only the capital ratio was significant. Variations in deposit growth were mainly accounted for by returns on the deposits, bank transaction services, and the asset size of the bank. The coefficients of these variables came out strong in magnitude and significance. The macroeconomic variables were all significant for deposit growth equations indicating that depositors' choice of whether to invest in bank deposits is affected by the macroeconomic environment. During the crises period, (column 4 & 5), depositors were more responsive to bank fundamentals as capital ratios, and return on assets become significant and play major roles in deposit growths and interest rate than the alternative return and size variables. Depositors care more about risk exposures than return in their choice of banks. At the post-crisis era, (column 6 and 7), depositor sensitivity to bank insolvency risk as represented by the bank fundamentals seems to persist but they are not as strong as in the crises periods<sup>8</sup>. The overall evidence tend to support the hypothesis that banking crises acts as a wake-up call for depositors in monitoring the risk behaviour of their banks.

Although bank fundamental variables were relative weak in explaining deposit growth and interest rate changes in banks during the pre-crisis period, such variables become highly significant during the crises periods. This suggests that although information asymmetries may prevent depositors from effectively monitoring their banks, depositors actually wake up to their

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<sup>8</sup> The variables were significant at 1 percent level of significant during the crises period, but are only significant at 10 percent level during the post-crisis periods

responsibilities during banking crises when some of them actually loose funds to distressed and failed banking institutions.

**Table 7: Panel Regression Results for Growth in Total Deposit and Deposit Interest Rates Before, During and after the Banking Crises of 19998**

Variable	Pre-Crises Period 1995q1-9972q4		Crises Period 1997q3-1999q2		Post Crises Period 1999q3-2004q4	
	Deposit Growth	Deposit Interest Rate	Deposit Growth	Deposit Interest Rate	Deposit Growth	Deposit Interest Rate
Constant	0.410 (2.214)	<b>0.194</b> (7.023)	<b>0.543</b> (2.005)	<b>0.741</b> (2.780)	<b>0.341</b> (6.788)	<b>0.633</b> (7.023)
NPL	<b>-0.066</b> (0.034)	<b>0.025</b> (0.094)	<b>-0.394***</b> (5.739)	<b>-0.325***</b> (9.254)	<b>-0.225**</b> (2.250)	<b>0.523</b> (0.678)
PROV	<b>0.001</b> (0.002)	<b>0.001</b> (0.005)	<b>0.002</b> (0.011)	<b>0.081</b> (1.001)	<b>0.081</b> (1.001)	<b>0.021</b> (0.044)
CAP	<b>0.136*</b> (1.785)	<b>-0.255*</b> (1.994)	<b>0.728***</b> (10.399)	0.529*** (12.213)	<b>0.328**</b> (2.119)	<b>-0.245*</b> (1.996)
ROA	<b>0.005</b> (0.001)	<b>0.005</b> (0.003)	<b>0.322***</b> (5.411)	<b>0.221***</b> (7.405)	<b>0.211**</b> (2.940)	<b>-0.031</b> (0.032)
LIQ	<b>0.020</b> (0.090)	<b>0.022</b> (0.031)	<b>0.180</b> (0.197)	<b>0.015</b> (0.019)	<b>0.012</b> (0.087)	<b>0.333*</b> (1.897)
r	<b>0.123</b> (0.213)	-	<b>0.794***</b> (11.006)	-	<b>0.189</b> (0.451)	-
BRANCH	<b>0.376**</b> (3.612)	0.002 (0.001)	<b>0.041**</b> (1.005)	<b>0.310</b> (0.321)	<b>0.233*</b> (1.798)	<b>0.002</b> (0.250)
STATE	<b>0.003</b> (0.001)	<b>0.001</b> (0.000)	<b>-0.225**</b> (3.004)	<b>0.327***</b> (5.250)	<b>0.011</b> (0.455)	<b>0.001</b> (0.005)
FOREIGN	<b>0.001</b> (0.003)	<b>0.001</b> (0.012)	<b>0.112</b> (0.227)	<b>0.020</b> (0.022)	<b>0.134</b> (1.022)	<b>0.002</b> (0.000)
Log Assets	<b>0.565***</b> (6.670)	<b>0.011</b> (0.121)	<b>0.253**</b> (1.911)	<b>0.371**</b> (1.987)	<b>0.283**</b> (2.220)	<b>-0.297**</b> (2.112)
COB	<b>0.245***</b> (2.557)	<b>0.159</b> (1.004)	<b>0.319**</b> (5.278)	<b>0.119</b> (0.092)	<b>0.214**</b> (4.560)	<b>0.045</b> (1.235)
RGDP	<b>0.177**</b> (1.429)	<b>0.054</b> (0.091)	<b>0.099</b> (0.081)	<b>-0.111</b> (0.891)	<b>0.099</b> (0.081)	<b>0.010</b> (0.910)
INF	<b>-0.212**</b> (2.750)	<b>0.610***</b> (3.491)	<b>0.315**</b> (2.918)	<b>0.345***</b> (5.411)	0.455*** (5.763)	<b>0.355</b> (3.550)
ASI	<b>-0.294*</b> (2.942)	<b>0.241*</b> (1.555)	<b>-0.365**</b> (3.005)	<b>0.199*</b> (2.330)	<b>-0.392***</b> (3.900)	<b>0.215*</b> (1.885)
Adj. R <sup>2</sup>	0.645	0.479	0.750	0.340	0.690	0.485
F-Statistic	13.50	7.21	23.41	5.35	22.72	7.54
No. of Obs.	2,514	2,514	2,514	2,514	2,514	2,514
No. of Banks	63	63	63	63	63	63

\* signifies at 10% level of significance, \*\* signifies 5 % level of significance and \*\*\* 1 % level of significance. Numbers in parenthesis are t-statistics

### 5.3 Market Discipline and Bank Health Status

This section examines whether market discipline is stronger in healthy or weak banks. We use bank capitalization and asset quality to subdivide our sample into two health categories. In particular, a bank is considered weak if its capital adequacy is below the statutory

minimum,( capital to risk-weighted asset ratio of 8 percent), and/or has a non-performing loans to total loan ration below the median level for the all banks. Others are considered to be healthy banks. In our sample identified weak banks range from total number of 9 to 15 in different periods of the study. Table 8 below reports the regression estimates for both healthy and weak banks. For healthy banks, the major determinants of deposit growth are the capitalization, profitability, and size. For the weak banks, the major source of discipline is deposit growth channel. Here deposit growth is sensitive to bank asset risk, capitalization and return. In particular bank capitalization remains the major attraction of deposits as this variable has the largest influence in terms of the absolute size of the coefficient (0.376) followed by return on deposits with absolute size of coefficient (0.350). The only fundamental that influences deposit interest rates for both healthy and weak banks is the capital ratio of the banks.

Deposits are only sensitive to bank capitalization (CAP), and return on assets (ROA) for the healthy banks. However, for the weak banks, it appears that the degree of sensitivity (as measured by the number of fundamentals that are significant) is stronger for the weak banks than for the healthy banks. Depositors appear to be more concerned about bank fundamentals at the weak banks than the healthy ones. This suggests that depositors are weary of weak banks and are able to discriminate against them.

Table 8: Results of the Panel Regression Analysis by Bank Health Status

Variable	Healthy Banks		Weak Banks	
	Deposit Growth	Interest on Deposits	Deposit Growth	Interest on Deposits
Constant	<b>0.560</b> (3.255)	<b>0.236</b> (6.233)	<b>0.333</b> (4.520)	<b>.752</b> (7.234)
NPL	<b>-0.135</b> (0.022)	<b>0.094</b> (0.011)	<b>-0.294***</b> (3.155)	<b>0.254</b> (0.250)
PROV	<b>0.001</b> (0.03)	<b>0.001</b> (0.000)	<b>0.031</b> (0.107)	<b>0.015</b> (0.021)
CAP	<b>0.472**</b> (2.998)	<b>-0.129**</b> (2.854)	<b>0.376***</b> (3.150)	<b>0.459***</b> (3.589)
ROA	<b>0.259**</b> (2.550)	<b>-0.011</b> (0.011)	<b>0.282**</b> (2.750)	<b>0.035</b> (0.025)
LIQ	<b>0.015</b> (0.020)	<b>0.028</b> (0.019)	<b>0.094**</b> (1.820)	<b>0.023</b> (0.012)
r	<b>0.099</b> (0.052)	-	<b>0.350***</b> (3.751)	-
BRANCH	<b>0.223*</b> (1.899)	<b>0.003</b> (0.001)	<b>0.133*</b> (1.761)	<b>0.005</b> (0.004)
STATE	<b>0.001</b> (0.001)	<b>0.010</b> (0.011)	<b>0.005</b> (0.010)	<b>0.001</b> (0.002)
FOREIGN	<b>0.020</b> (0.021)	<b>0.008</b> (0.020)	<b>0.006</b> (0.02)	<b>0.011</b> (0.019)
COB	<b>0.241*</b> (2.240)	<b>0.078</b> (0.885)	<b>0.259**</b> (2.005)	<b>0.159</b> (0.998)
Log Assets	<b>0.274*</b> (2.298)	<b>0.122*</b> (1.022)	<b>0.162*</b> (1.810)	<b>0.154**</b> (1.677)
RGDP	<b>0.289*</b> (2.309)	<b>-0.049</b> (0.590)	<b>0.209*</b> (2.010)	<b>0.194*</b> (1.898)
INF	<b>-0.335**</b> (3.565)	<b>0.286**</b> (3.049)	<b>-0.284***</b> (4.290)	<b>0.219***</b> (2.665)
ASI	<b>-0.212*</b> (1.995)	<b>0.295**</b> (3.080)	<b>-0.250***</b> (3.988)	<b>0.121*</b> (1.497)
Adj. R <sup>2</sup>	0.65	0.45	0.55	0.43
F-Statistic	15.20	8.21	10.66	7.60
No. of Obs.	1620	1620	960	960
No. of Banks	49	49	14	14

\* signifies at 10% level of significance, \*\* signifies 5 % level of significance and \*\*\* 1 % level of significance. Numbers in parenthesis are t-statistics.

#### 5.4 Evidence of Bank Responsiveness to Deposit Reaction

The results shown on the previous sections suggest that depositors react to increasing default risks of banks, especially through the deposit growth channel. These results also suggest that depositors' reaction to bank risks is stronger after the 1998 banking crises that led to the closure of 26 banks at a time. However, this is not a conclusive evidence of the existence of market

discipline. The second but sufficient condition for the existence of market discipline is that banks do in fact respond to the signals sent by depositors in form of declining deposit growth. We investigate the effectiveness of market discipline through the mean reversion hypothesis proposed by Calomiris and Powel (2001). This indirect test assumes that if banks are forced to increase their interest rates due to depositors' actions, and they feel disciplined, banks will reduce their risk taking and consequently interest rates will revert to their means. Accordingly, we examine whether there is a tendency for individual bank interest rates to revert to their mean. The results of our mean reversion equation are shown in Tables 9 and 10 below. Based on Hausman Test, the restrictions of random effects was rejected, implying the fixed effects estimator is preferred. In Table 9, the result could not support the hypothesis of mean reversion for Time deposit interest rates. The coefficient of the lagged interest rate is negative only for one period, 1999:1-200:4. The rest show a positive coefficient which were inconsistent with the hypothesis of mean reversion

Table 10 however confirms this hypothesis for inter-bank interest rates. The results indicate that interest rates revert to their mean, even though the speed of adjustment may be low. For the period, 2005:1-2005:4, the speed of adjustment was relatively high. This is quite understandable since this period coincides with the deadline for consolidation exercise when all banks are trying to reduce risks to enable them meet beef up their capital to meet the new recapitalization requirement.

Table 9: Fixed Effects Regressions\*:  
 Deposit Interest Rate Mean Reversion Regression  
 Dependent Variable: Change in Time Deposit Interest Rate

Quarterly Observations for 1999:1 – 2005:4

	Period 1 1999:1-2000:4	Period 2 2001:1-2002:4	Period 3 2003:1-2004:4	Period 4 2005:1-2005:4
$r_{i,t-1}$	-0.015 (0.05)	0.004 (0.03)	0.450 (0.04)	0.025 (0.04)
Adj. R <sup>2</sup>	.45	0.55	0.39	0.40
<b>No. of Banks</b>	44	44	53	47
No. of Obs.	352	352	424	376

\*All regressions include a fixed firm and time effects which are not reported here  
 $r_{i,t-1}$  is the lagged interest rate for each bank

Table 10: Fixed Effects Regression:  
 Inter-bank Deposit Interest Rate Mean Reversion Regression  
 Dependent Variable: Change in Inter-bank Deposit Interest Rate

Quarterly Observations for 1999:1 – 2005:4

	Period 1 1999:1-2000:4	Period 2 2001:1-2002:4	Period 3 2003:1-2004:4	Period 3 2005:1-2005:4
$r_{i,t-1}$	-1.195 (0.05)	-0.65 (0.03)	-0.77 (0.04)	-0.95 (0.04)
Adj. R <sup>2</sup>	0.47	0.45	0.35	0.43
No. of Banks	44	44	53	47
No. of Obs.	352	352	424	376

All regressions include a fixed firm and time effects which are not reported here

$r_{i,t-1}$  is the lagged interest rate for each bank

The “fixed-effects” approach to examining mean reversion holds firm and time effects constant and constrains all banks to react in the same manner to changes in their deposit interest rate. On the other hand, we also estimated the relationship using a “random coefficients” approach, which investigates whether banks differ in the degree to which their deposit interest rates revert to the mean. As the results for these two models were quite similar, we only report the “fixed effects” results in our tables 9 and 10 above

## 6.0 Policy Implications

Market Discipline and traditional banking supervision are complementary. On the one hand, market discipline may enhance supervisory discipline, on the other hand, regulations and supervision can enhance market discipline. This is because market and supervisors may have different information set and thus may rely on each other for their complete effectiveness. For instance, although the market and the supervisor have the same basic information published by the bank, the market may not have access to confidential information reported only to the supervisors. The supervisors, themselves, may lack the fine transaction information that come from repeated market transactions.

The existence of some supervisory failures suggests harnessing of some market potentials to discipline banks as a complementary form of supervision. In this section, we are concerned with the specific policies that may be and have been used to enhance market discipline.

First, market discipline relies on useful and timely information. Disclosure is critical to the effectiveness of market discipline. In developed countries, disclosure rules on banks typically refer to information released by the banks on a quarterly or even semi-annual basis. Nigeria has in general adopted stricter rules. Typically, banks report to supervisors who combine reports on

regular basis, usually, monthly. Data requirements include balance sheet and income statements and information on asset portfolio intended to describe credit risk and other risks. Regulators and rating agencies take the individual bank data and calculate ratios and compare the information across banks by constructing peer group tables for ratios summarizing risk and efficiency.

The important questions are whether banks or regulators publish the banks' regulatory ratios at the level of individual banks? And whether an individual bank complies with particular regulations? Although the 1988 Basel Accord did not call for banks to disclose their regulatory capital requirements or actual regulatory capital ratios, (Basel I – defined capital divided by assets at risk), some countries have indeed asked banks to publish their Basel I – calculated capital requirements and their actual capital ratios. Some countries have also asked banks to publish required liquidity levels and actual liquidity ratios; required provisioning levels and actual provisions. Moreover, as required in chapter 16, Basel II, Pillar 3 explicitly calls for banks to disclose a number of features regarding their risk portfolios. Basel II calculates capital requirements and actual regulatory capital. It is clear that the trend is towards greater disclosure regarding bank risks, regulatory requirements, and actual regulatory ratios in order to provide wider information for the market.

A second policy issue is to produce accurate information. In this regard, the task of bank auditors is particularly important. As previous bank failures and the recent consolidation exercise have revealed banks can form highly complex financial structures that make the financial risks of such banks less than fully transparent. The potential of financial engineering to make true risks opaque is particularly put in place with the aid of bank auditors. In recent corporate scandals, auditors either did not understand or did not wish to reveal the true nature of the risks of their clients<sup>9</sup>. It is therefore of critical importance to consider carefully the incentives of auditors to truly understand and report the underlying risks of banks. Some countries have, in part due to their poor experiences with auditors, have gone so far as to construct lists of authorized bank auditors and hence threaten to remove an auditor from the list in case of negligence. Another possibility is to ask auditors for a financial bond to be forfeited in case of proven negligence.

Another strategy that has been adopted by some countries to enhance monitoring by the market is to make banks seek credit rating and to make their credit rating public. This policy would ensure that an outside body that is not the supervisor, but is skilled in risk analysis, gives an objective and informed opinion regarding the risks of banks. The regulators may have limited the number of authorized rating agencies to a few internationally recognized agencies that would suffer too much in terms of reputations to devalue their ratings.

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<sup>9</sup> The 2001 foreign exchange roundtrip in which a number of banks were suspended is a typical example.

Furthermore, In order to provide a bank with market discipline and give signals about banks to regulators, private investors must hold instruments whose value is threatened when an institution takes risk. It is therefore pertinent for banks to be made to issue small but significant quantity of subordinated debts. This proposal has attracted considerable academic and policy interests, especially in the United States and Europe. Argentina has actually applied the policy. The underlying idea is to ensure that each bank has some explicitly uninsured and unsecured liabilities held by sophisticated investors at arm's length, which could constitute the first loss in case of bank failure. Given the lower seniority of this debt if the bank were to fail and assets liquidated, a subordinated debt holder receive payment only after all senior creditors, including insured and uninsured depositors, receive complete payment. The subordinated position of the claim thus increases the severity of loss in the event of failure. From this vulnerability flows the incentive to discipline. The proposal is normally that banks must issue a small amount of such debts with a minimum maturity, (say 12 months) each year and that the debt may qualify as tier 2 capital for the purposes of Basel style capital requirement regulation. In principle, holders of subordinated debts can impose market discipline on a bank via direct and indirect channels. They can discipline directly by raising the cost of newly issued subordinated debt. They can discipline indirectly when signals from the subordinated debt market raise the firms other costs. Clomiris (1998) suggests that emerging country subordinated bank debts be held by a group of only 50 or so pre-authorized international investors. The proposal aims at creating a class of financially sophisticated creditors who are subject to loss if a bank becomes insolvent and who are unlikely to be protected by implicit government guarantees. These creditors would have substantial financial incentives to monitor, assess, and price risk. It is believed that higher levels of subordinated debts increase market discipline by making the bank's costs more risk sensitive, and that for regulators, yields in the subordinated debt market will be a clear signal for the private markets' view of bank risk. The emergence of some institutional investors like pension fund administrators and the recently consolidated insurance industry will provide markets for this instrument.

Finally, effective market discipline also requires an efficient and complementary deposit insurance system. It is in the light of this that we recommend risk-based pricing of the deposit insurance premium in lieu of the present flat rate system. In fact the introduction of risk-based premium would minimize moral hazard, especially those arising from adverse selection. The risk-based pricing of deposit insurance should be set high enough to cover the expected reimbursement that would be needed in the event of one or more bank failures and vary with the riskiness of individual bank – with weak or poorly capitalized banks being made to pay more. It

would be desirable to base pricing of risk-based premium on the latest CAMEL rating available for an individual bank.

## **7.0 Conclusion**

In this study, we have raised two important questions: (1) whether Nigerian banking public (depositors) respond to bank risk taking behaviour; and (2) if they do, whether this response is strong enough to deter banks from excessive risk taking. We address these questions by specifying two sets of models; the deposit response model tracking the monitoring aspects of our topic and the bank response model exploring the influence aspects of the topic.

Our results show that deposit growth and interest rates are weakly sensitive to bank risk characteristics, while interest rates (inter-bank interest rates) also respond to bank risks. Deposit channel of response seem to be stronger. Results also indicate that these responses are stronger in weak banks than in healthy banks. And that banking crises of the late 1990s seem to have awakened depositors to their responsibilities.

On the other hand, only Inter-bank deposits interest rates tend to revert to their means. In any case, they do so at a very low speed. On the other hand, Time deposit interest rates fail to show any evidence of mean reversion. The implication of this is that although depositors may monitor their banks and in fact do respond to their solvency risks, (systemic risks), banks do not necessarily respond to the signals sent by depositors. The results of the bank response function fail to establish the mean reversion behaviour of interest rates, particularly for Time deposit interest rates. Nevertheless, the fact that inter-bank deposit interests do in fact mean revert, it may be that banks are mindful of the ability of their sister institutions (other banks) to boycott them at clearing houses, a situation that sends a stronger signal of insolvency to the entire market.

Although the traditional test of market discipline which examines the sensitivities of deposit growth and interest rate to bank fundamentals show a weak response, the result is a little more complicated. The lack of evidence of strong market discipline does not imply that market participants are not sensitive to bank risks. In the context of a developing market, institutional constraints affecting incentives and information accuracy may limit depositors' ability to monitor banks. Nevertheless, when examined in the context of systemic risks, it becomes more obvious that depositors actually care about the health of their banks. It could be that they are not able to monitor banks due to lack of timely information about the risk characteristics of the banks. Since systemic risks are more obvious than individual risk characteristics, depositors tend to respond more to this type of risks than individual bank characteristics.

Based on the above results, we have made some policy suggestions as a way to enhance market discipline in deposit money banks in Nigeria. First, we call for policies that will enhance

bank disclosure practices and more importantly we call for the introduction of subordinated debts to increase the base of risk sensitive instruments available to the investing public. Finally we advocate the strengthening of the deposit insurance system by introducing risk-based insurance premium for the banks.

## References

- Acharya V. Viral and Tanju Yorulmazer, (2005), “Too-Many-To-Fail: An Analysis of Time-inconsistency in Bank Closure Policies”, Unpublished paper, Bank of England, and CEPR, January 2005.
- Adam, B. Ashcraft, (2006), “Does Market Discipline Banks? New Evidence from Regulatory Capital Mix” *Federal Reserve Bank of New York Staff Report No. 244 March 2006*; A Paper Presented at the Conference on Bank Regulation and Corporate Finance: Challenges for the Future held at World Bank Quarters Washington D. C. Oct. 26 – 27, 2006.
- Adrian Pop, (2006), “Market Discipline in International Banking Regulation: Keeping the Playing Field Level”, *Journal of Financial Stability*, Vol. 2 No. 3, October. Pp. 286 – 310.
- Aggarwal, Raj and Kevin T Jacques, (1998), “Assessing the Impact of Prompt Corrective Action on Bank Capital and Risk” *Federal Reserve Bank of New York Economic and Policy Review*, Oct. pp. 23 – 32
- Arellano, M. (2003), *Panel Data Econometrics*, Oxford: Oxford University Press.
- Baer, Herbert and Elijah Brewer, (1994), “Uninsured Deposit as a Source of Market Discipline: Some New Evidence”, *Economic Perspectives*, Federal Reserve Bank of Chicago, (September/October), pp. 23-31
- Baltagi, H Badi, (2005), *Econometric Analysis of Panel Data* Chichester, England, John Wiley & Sons, 3<sup>rd</sup> edition.
- Barajas Adolfo and Rober Steiner, (2000) “Depositor Behaviour and Market Disciplines In Colombia”, *IMF Working Paper* No WP/00/214, (December)
- Beck Thorsten, Asli Demirguc-Kunt and Ross Levine, (2005), “Bank Supervision and Corruption In Lending” NBER Working Paper No. W11498, (August).
- Barth, James R, Gerald Caprio, Jr. and Ross Levine, (2001), “The Regulation and Supervision of Bank around the World: A New Database”, in Robert E. Litan and Richard Herring, Eds, *Integrating Emerging Market Countries into the Global Financial System*, Brookings – Wharton Papers on Financial Services, Brookings Institution Press. P. 183-240
- \_\_\_\_\_, (2003), “Bank Regulation and Supervision: What works Best?” *Journal of Financial Intermediation*
- Berger, Allen, (1991), “Market Discipline in Banking”, *Proceedings of a Conference on Bank Structure and Competition*, Federal Reserve Bank of Chicago.

- Billent, Matthew T. and Jon A. Garfinkel and Edward S. O' Neal, (1998), "The Cost of Market Vs. Regulatory Discipline in Banking", *Journal of Financial Economics*, Vol. 48 pp. 333-358
- Birchler, W. Urs and Maechler M. Andrea, (2001) "Do Depositors Discipline Swiss Banks" *Studienzentrum Gerzensee, Swiss National Bank Working Paper No 01.06*
- Bliss R. Robert and Mark J. Flennary, (2002), "Market Discipline in the Governance of US Bank Holding Companies: Monitoring Vs Influence", *European Finance Review*, Vol. 6 pp. 419-437
- Blum, Jurg, (2000), "The Limits of Market Discipline in Reducing Banks' Risk Taking", Working Paper, Swiss National Bank, June 2000.
- Board of Governors, Federal Reserve System, (1999), "Using Subordinated Debt as an Instrument for Market Discipline", *Staff Study No. 172*, Study Group on Subordinated Notes and Debentures, Federal Reserve System, Washington DC December.
- \_\_\_\_\_, (2000), "Improving Public Disclosure in Banking", *Staff Study No. 173 Study Group on Disclosure, Federal Reserve System, Washington DC (March)*.
- Boyd J. H and Prescott, E. (1996), "Financial Intermediary Coalitions" *Journal of Economic Theory*, 38, 211-232.
- Calomiris, W. Charles and Andrew Powell, (2000), "Can Emerging Market Bank Regulators Establish A Credible Discipline: The Case of Argentina, 1992-1999" *National Bureau of Economic Research (NBER) Working Paper No. 7715* May.
- Ciancanelli, Penny and Jose Antonio Reyes Gonzalez, (2000), "Corporate Governance in Banking: A Conceptual Framework" Paper Presented at the European Financial Management Association Conference, Athens, (June). Social Science Research Electronic Paper Collection: [http://papers.ssrn.com/paper.taf?abstract\\_id=253714](http://papers.ssrn.com/paper.taf?abstract_id=253714)
- Cordella Tito and Eduardo Levy-Yeyati, (1997), "Public Disclosure and Bank Failures" *IMF Working Paper No WP/97/96*, August.
- Caprio, Gerald Jr. and Ross Levine, (2002), "Corporate Governance in Finance: Concepts and International Observations", in *Litan R. E , M, Pomeroleano and V. Sundararajan, Ed. Financial Sector Governance: The Role of Private and Public Sectors*, Brookings Institution Press.
- Crabbe, L and M. A. Post, (1994), "The Effects of Rating Downgrades on Outstanding Commercial Paper" *Journal of Finance*, Vol. 49, pp. 38 -56.
- Demirguc-Kunt Asli and Harry Huizinga, (1999), "Market Discipline and Financial Safety Net Design", *Centre for Economic Policy Research, (CEPR), Discussion Paper No 2311*, September
- Demirguc-Kunt Asli and Enrica Detragiache, (2002) "Does Deposit Insurance Increase Banking System Stability? An Empirical Investigation", *Journal of Monetary Economics*, Vol. 49 No 7 pp. 1373-1406
- Demsetz S. Rebecca, (1997), "Agency Problem and Risk Taking in Banks" FRBNY Staff Report No. 29  
Sept

- Demsetz S. Rebecca, Saidenberg, M.R, and Strahan, P. E., (1996), “Banks with Something to Lose: The Disciplinary Role of Franchise Value. *FRBNY Economic Policy Review*, pp. 1- 14  
----- (1997), “Diversification, Size and Risk at Bank holding Companies”  
*Journal of Money, Credit and Banking*. Volume. 29 pp. 300 - 13
- Demsetz Harold and Kenneth Lehn, (1985), The Structure of Corporate Ownership: Causes and Consequences”*Journal of Political Economy*, (93) 1155 – 1177
- De Nicolo Gianni, (2000), “Size, Charter Value and Risk Taking in Banking: An International Perspective” *International Finance Discussion Paper No. 689*, Board of Governors of the Federal Reserve System. December
- Diamond, Douglas W. and Philip H. Dybvig, (1983), “Bank Runs, Deposit Insurance and Liquidity”, *Journal of Political Economy*, Vol. 19 No. 3 (June), pp. 401-419
- Davenport Andrew Mitsunori and Kathleen Marie McDill (2005), “The depositors Behind the Discipline: A Micro-level Case Study of Hamilton Bank”. *FDIC Center for Financial Research Working Paper No. 2005 - 07*
- Ellis David and Mark J. Flannery, (1992), “Does the Debt Market Assess Large Banks’ Risks? Time Series Evidence from Money Center CDS”, *Journal of Monetary Economics*, Vol. 30, pp.481-502
- Evanoff, Douglas D. and Larry D. Wall, (2000), “Subordinated Debt and Bank Capital Reforms” , *Working Paper No. WP 2000-07*, Federal Reserve Bank of Chicago.
- Flannery, M. J, (2001), “The Faces of Market Discipline” *Journal of Financial Services Research*, 20 (2&3) pp. 107 – 119.
- Flannery, M. J. and S. M. Sorescu, (1996), “Evidence of Bank Market Discipline in Subordinated Debenture Yields: 1983 – 1991” *Journal of Finance*, Vol, 51, pp.1347 – 77.
- Gilbert R. Alton, (1990), “Market Discipline of Bank Risk: Theory and Evidence” *Review Federal Reserve Bank of St. Louis*. Jan. – Feb. pp. 3 - 18
- Godlewski, J. Christophe, (2004), “Capital Regulation and Credit Risk Taking: Empirical Evidence from Emerging Market Economies” [www.econwpa.wustl.edu/eprints/fin/papers/04/09/0409030.abs-7k-12](http://www.econwpa.wustl.edu/eprints/fin/papers/04/09/0409030.abs-7k-12) Apr
- Goldberg Lawrence and Sylvia Hudgins, (1986), “Response of Uninsured Deposit to Impending S&L Failures: Evidence of Depositor Discipline” *Quarterly Review Of Economics and Finance* Vol. 36 pp. 311-325
- Grossman, Richard S., (1992), “Deposit Insurance, Regulation and Moral-Hazard in Thrift Industry: Evidence from 1980s” *American Economic Review* Vol.82 No. 4 (September), pp.800-821
- Hamalainen Paul, Maximilian Hall and Barry Howcroft, (2005), “ A Framework for Market Discipline in Bank Regulatory Design”, *Journal of Business Finance and Accounting*, 32 (1) & (2) January – March, 2005, 0506-686X, pp. 183 – 209.
- Hamalainen Paul, (2006), “Market Discipline and Regulatory Authority Oversight: Complements Not Substitutes” *The Services Industries Journal*, Vol. 26 No. 1, January 2006, pp. 97-117
- Hancock Diana and Kwast Myron L.,(2001),”Using Subordinated Debts to Monitor Bank Holding

- Companies: Is It Feasible? [www.federalreserve.gov/feds/2001/200122/200122paper.pdf](http://www.federalreserve.gov/feds/2001/200122/200122paper.pdf)
- Hori, Masahiro; Yasuaki Ito, and Keiko Murata, (2005), "Do Depositors Respond to Bank Risks as Expected? Evidence from Japanese Financial Institutions in the Banking Crises" Economic and Social Research Institute, No. 151. July 2005.
- Hosono, Kaoru, (2004), "Market Discipline in Bank Regulation and Governance" Asian Development Bank ADB Institute, [www.adbi.org/conf-seminar-papers/2004/06/519](http://www.adbi.org/conf-seminar-papers/2004/06/519)
- Hsiao, Cheng, (2003), *Analysis of Panel Data*, Cambridge University Press, 2<sup>nd</sup> edition
- Jacques Kevin and Peter Nigro, (1997), "Risk Based Capital, Portfolio Risk and Bank Capital: A Simultaneous Equation Approach. *Journal of Economics and Business* (4) PP. 534 – 547
- Jeitschiko Thomas and Shin Dong Jeung, (2004), "The Effects of Capitalization on Bank Risks Under Regulation and Moral Hazard: A Theoretical and Empirical Investigation" Available online at <http://www.ssrn.com/abstract=629414>
- , ((2005), "Incentives for Risk Taking in Banking: A Unifies Approach", *Journal of Banking and Finance*, 29 (2005). Pp. 759 – 777.
- John Kose and Yiming Quian, (2003), "Incentive Features in CEO Compensation in the Banking Industry" *Economic Policy Review*, Federal Reserve Bank of New York, April, pp.109- 121.
- John Kose, Anthony Saunders and Lemma W. Sembet, (2000), "A Theory of Bank Regulation and Management Compensation", *Review of Financial Studies*, Vol. 13 No. 1, Spring. pp. 95-125.
- John Kose, Teresa A. John and Lemma W. Sembet, (1991). "Risk Shifting Incentives of Depository Institutions: A New Perspective on FDIC Reform, *Journal of Banking and Finance*, Vol. 15, Issue 4-5, September, pp.895-915.
- Jordan S Jordan, (2000), "Depositor Discipline at Failing Banks". *New England Economic Review*, Federal Reserve Bank of Boston, March/April, pp 15-28
- Kalfaoglou Faidon and Alexandros Sarris, (2006), "Modelling the Components of Market Discipline" Bank of Greece Working Paper No. 36, April.
- Karacadag Cem and Animesh Shrivastava, (2000), "The Role of Subordinated Debt in Market Discipline: The Case of Emerging Markets" IMF Working Paper No WP/000/215.
- Kwast, et al, (1999), "Using Subordinated Debts as Instruments of Market Discipline" *Staff Study*, Board of Governors of Federal Reserve System.
- Lane, T. D. (1993), "Market Discipline" IMF Staff Paper, Vol. 40, pp. 53 - 88
- Levine, Ross, (1997), "Financial Development and Economic Growth: Views and Agenda", *Journal of Economic Literature*, Vol. XXXV (June), pp. 688-726
- \_\_\_\_\_, (2003), "The Corporate Governance of Banks: A Concise Discussion of Concepts and Evidence" Paper presented at Global Corporate Governance Forum, Washington DC, July 21, 2003.
- Levy-Yeyati Eduardo, Maria Soledad Martinez Peria and Sergio L. Schmukler, (2004), "Market Discipline Under Systemic Risk: Evidence from Bank Runs in Emerging Market Economies". *World Bank Policy Research Working Paper No, 3440*. November.

- Marcus, A. (1984), "Deregulation and Bank Financial Policy" *Journal of Banking and Finance*, 8: pp. 557-565.
- Maechler M. Andrea and MacDill M Kathleen, (2003), "Dynamic Depositor Discipline In US Banking", *IMF Working Paper*, No WP/03/226. November
- Merton, Robert C. (1977), "An Analytical Derivation of the Cost of Deposit Insurance And Loan Gurantees" *Journal of Banking and Finance*, Vol. 2 (May), pp. 3-11
- Nier Erlend and Ursel Baumann, (2002), "Market Discipline, Disclosure and Moral Hazard in Banking", European Finance Association Annual Conference Paper No 664, 29<sup>th</sup> October
- \_\_\_\_\_, (2003), "Market Discipline and Financial Stability: Some Empirical Evidence", *Financial Stability Review* pp. 134-141
- Nigerian Deposit Insurance Corporation, NDIC, (2003), Annual Report and Statement of Accounts. NDIC Abuja Nigeria
- Noriko Inakura, Satoshi Shimizutani and Ralph Paprzycki, (2005), "Deposit Insurance and And Depositor Discipline: Direct Evidence on Bank Switching Behaviour in Japan" Hi-Stat Discussion Paper Series No. 125, Hitotsubashi University Research Unit for Statistical Analysis, Institute of Economic Research, Hitotsubashi University, Japan.
- Ogunleye, G. A. (2000) "Deposit Insurance Scheme in Nigeria: Problems and Prospects" *Paper Presented at The First Annual Conference of International Association of Deposit Insurers (IADI)*, Basel Switzerland, (May)
- Park Sangkyun and Peristiani Stavros, (1998), "Market Discipline by Thrift Depositors", *Journal of Money, Credit and Banking*, Vol. 30, No 3 (Part 1) August. Pp. 347 - 364
- (2001) "Are Bank Shareholders Enemies of Regulators or a Potential Source of Market Discipline?", *Fed. Reserve Bank of New York Staff Report No. 138*
- Peria Martinez Maria Soledad and Schmukler L. Sergio, (1999) "Do Depositors "Punish" Banks for Bad Behaviour?" Examining Market Discipline in Argentina, Chile and Mexico, *World Bank Working Paper* No 2058 (February)
- Prescott, Edward Simpson, (2002), "Can Risk-Based Deposit Insurance Premiums Control Moral-Hazard?" *Economic Quarterly*, Federal Reserve Bank of Richmond, Vol.88 No. 2, Spring. pp. 87-100
- Siera Gregory, Eli Talmor and James S. Wallace, (2003), "A Unifies Analysis of Executive Pay: The Case of the Banking Industry". Supervisory Policy Analysis Working Paper No 2004-02, Federal Reserve Bank of St. Louis. January 2004.
- Sobodu, A. A. (1998), "Risk-Taking and Distress in the Nigerian Banking Industry: An Analysis of Policy and Structural Influences" Department Seminar, Department of Economics University of Ibadan, November
- Sobodu. O. O. and P. O. Akiode, (1999), "Bank Performance, Supervision and Privatization in Nigeria: Analysing the Transition to a Deregulated Economy" *Final Report Presented to To AERC Workshop*, Nairobi Kenya. May

- Sobodu. O. O. and P. O. Akiode, (1996), "Managing Banking Policy and Bank's Financial Condition Under Deregulation in Nigeria: Impact Analysis Using Logit Regression Model. *Interim Report* Presented at AERC Workshop, Nairobi Kenya May.
- Soyibo Adedoyin, Alashi S.O, and Ahmad, M.K. (1996). "The Extent of Effectiveness of Banking Supervision in Nigeria" *A Final Report Presented at AERC Workshop, Nairobi Kenya*
- Stiglitz, Joseph E and Andrew Weiss, (1981), "Credit Rationing and Market with Imperfect Information", *The American Economic Review*, Vol 71 No 3 June 1981 pp 397 – 409
- Tirole, J., (2002), *Financial Crises, Liquidity and the International Monetary System* Princeton University Press
- Woodridge, J. M., (2002), *Econometric Analysis of Cross-Section and Panel Data*, Cambridge: MIT Press

