Private Sector Incentives and Bank Risk Taking:

A Test of Market Discipline Hypothesis in Deposit Money Banks in Nigeria

By

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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, are such responses 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 channel), our results suggest that deposit growth is 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 as only inter-bank interest rates show evidence of mean reversion.

Keywords: Bank risks, market discipline, regulation

JEL Classification: G21, G28, G29

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1. 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.

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 signalling 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 can sell their shares thereby putting downward pressure on the share prices and placing management under increased scrutiny (Berger, 1991).

Furthermore, market discipline does not only involve depositors' reaction but also the subsequent response by 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 incorporate 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.

The question of 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 suggests that depositors may be more sophisticated than theory suggests and that implies that there may be less need for protection in terms of extensive deposit insurance schemes.

Using a two-stage framework (monitoring and influence) and a two-channel approach

(quantity channel and price channel), our results suggest that deposit growth is 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. 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.

Problem statement

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 increased from 15 in 1991 to about 60 in 1995. In 1998, the regulatory authorities closed about 26 banks at once for their technical insolvencies. In 2002, two more banks were closed bringing the total number of banks closed since 1992 to 36. In 2003, official reports from Nigeria Deposit Insurance Corporation (NDIC) indicated that more than 45 out of the 89 operating banks in Nigeria were in one form of financial stress or the other and that about 11 of these banks were technically distressed (NDIC, 2003). All these took place in the face of greater responsibility given to private sector agents in monitoring and supervising banks. These and the anecdotal evidences of depositor runs on individual banks that have dotted the industry raise 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) Do depositors respond to bank risks as standard theories predict? 2) If they do, are such responses strong enough to deter banks from excessive risk-taking?

Objectives

The broad objective of this study is to test the market discipline hypothesis in Deposit Money Banks in Nigeria. In particular:

1. To examine whether bank deposit growths and deposit interest rates are sensitive to bank risk exposures.
2. To examine whether differences in deposit interest rates and deposit growth across banks reflect differences in bank risk characteristics.
3. To compare the responsiveness of depositors to bank risks before, during and after crises.
4. To investigate whether banks effectively respond to the signals provided by depositors by altering their risk preferences.
5. To make useful policy suggestions for bank regulatory design in Nigeria.

Hypotheses

Risk sensitivity of deposits and the corresponding risk sensitivity of deposit interest rates make excessive risk taking in banks costly which in turn motivates ex ante and ex post risk management. Thus, the study tests the hypotheses that:

1. Changes in insolvency risks affect deposit growth;
2. Changes in insolvency risks affect interest rates;
3. Market discipline is stronger in weak banks than banks perceived to be strong; and
4. Banking crises acted as a wake-up call for depositors to monitor the risk behaviour of their banks.

Research motivations

Nigeria offers an interesting case study for analysing 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. Furthermore, uninsured deposits account for more than 70% of total deposit liabilities in Nigerian banks (Table 2) 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 a Nigerian type environment.

2. Performance statistics of deposit money banks in Nigeria

Table 1 describes recent trends in average performance indexes 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 (ROA) increased from 3.5% in 1999 to 4.1% in 2001 before declining to 3.1% in 2003. Return on Equity (ROE) 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 indexes for Nigerian banks, 1999-2004

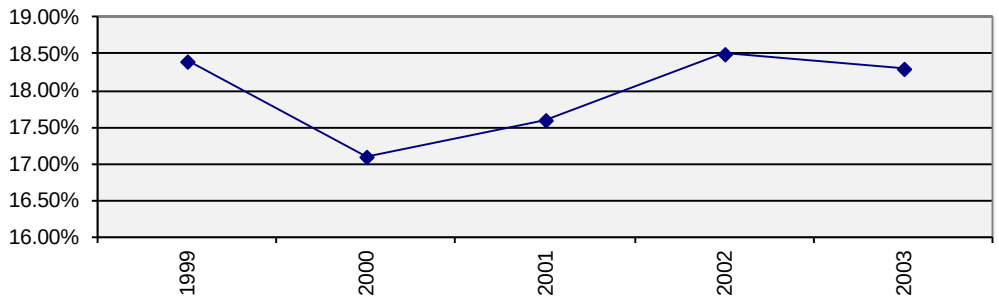
Index	1999	2000	2001	2002	2003	2004
Return on Assets, ROA, (%)	3.5	3.6	4.1	3.4	3.1	2.6
Return on Equity, ROE, (%)	41.4	46.5	50.6	38.4	32.6	27.2
Loan-Deposit Ratio (%)	45.5	43.8	53.6	47.3	51.0	60.2
Demand Deposit-Total Deposit Ratio (%)	58.9	50.6	47.7	46.9	47.2	49.6
Savings Dep.-Total Dep. Ratio (%)	19.9	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

Capital adequacy

On the average, banks exhibited adequate capitalization as indicated by capital to risk weighted asset ratio (CRWA) in Figure 1. CRWA grew at 18.4% in 1999, 17.6% in 2001 and 18.1% in 2003. At all times, the growth was 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.

Figure 1: Capital to risk weighted asset ratio of deposit money banks in Nigeria

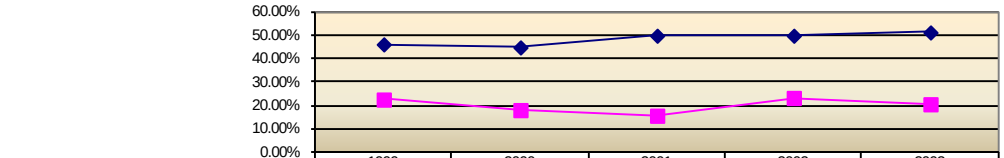


Source: CBN Banking Supervision Annual Report, various issues

Asset quality

On the other hand, the asset quality of deposit money banks is not as impressive (Figure 2). The ratio of non-performing loans (NPL) to total loans and advances remains high at about 20.7% for most periods of our review. The ratio of loan loss provision (LLP) 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.

Figure 2: Asset quality of deposit money banks in Nigeria



	1999	2000	2001	2002	2003
RiskWeighted Assets/ Total Assets + Contingents	46.30%	45.00%	50.00%	50.00%	51.40%
Nonperforming Loans/Total Loans & Advances	22.70%	18.20%	15.80%	23.40%	20.70%

Source: CBN Banking Supervision Annual Report, various issues

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% of total deposit liabilities in an institution per annum; the scheme covers a maximum amount of N50,000 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 -148.94 in 2003, a situation that portrays negative shareholders' fund for the affected banks.

Deposit structure of Nigerian banks

Deposits, including uninsured deposits, play a vital role as a funding source for banks. In Table 1, the proportion of demand deposits to total customer deposits ranged from 46.9% in 1999 to 50.6% in 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 2000 to 35.1% in 2002 before slightly declining to 34.7% in 2003 (Chart 1). 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 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 of 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% throughout the three-year period. This distribution

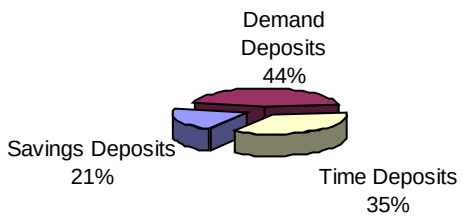
Table 2: Bank performance indexes by health, 2001 - 2003

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.

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)



Bankruptcy experience in Nigeria

The liquidation of Savannah Bank in 2002 brought to 35 the number of bank failures in Nigeria since 1993. Out of this number, the Nigerian Deposit Insurance Corporation (NDIC) has paid depositors of 33 failed banks almost 100% of their deposits, and paid liquidation dividends to other creditors (NDIC, 2003). The remaining two are those whom the bank management have secured court injunction against NDIC. Although by the Act establishing it, NDIC covers deposits of N50,000 and above at all licensed banks, the payment of all depositors of failed banks, the full amount of their deposits implies 100% coverage. Though commendable from the point of view of depositors, this action has serious implications for bank regulation and market discipline in Nigeria. Thus, the experiences of actual bankruptcy make future bankruptcy credible. Since the Insurance Corporation will pay, in case of failures, why must banks not take additional risks if the returns are high? More importantly, past experiences have shown that depositors always recover their money even if the bank fails, why must they bother themselves with monitoring bank risks, especially, when such monitoring involves some risks?

3. Literature review

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 downgrades in the 1986–1991 period and find a negative impact of a downgrade on the subsequent CP outstanding. Baer and Brewer (1994), Hannan and Hanweck (1988) and Ellis and Flannery (1992), among others analyse 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, tested 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) examined the banking industry in emerging markets of Argentina, Chile and Mexico

to see if the market disciplined banks in the 1980 and 1990s. Using a set of bank panel data, they tested for the presence of market discipline by studying whether depositors punish risky banks by withdrawing deposits. They found out 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) examined how depositors choose among different banks over time in Colombia, focusing on whether they discipline bank behaviour. Their panel data estimates for 1985–1999 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) adopted both price and quantity approaches to test the presence of market discipline. They investigated 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 Billett et al.(1998), however, raise oncern 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 suggests 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 incorporate 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 Powelll (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 et al. (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 the higher this index is, 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 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. Examples include Peria and Schmukler (1999), who found that bank deposit volumes varying according to bank risk behaviour in Argentina, Chile and Mexico. Barajas and Steiner (2000) found 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 Powelll (2000) found 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 impact 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 (1993) 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 (1994, 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 shows 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 et al. (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 analysing 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 a need to extend the research further to incorporate this topical issue. This is what this study attempts to achieve.

4. Analytical framework

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 cannot 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 (that is, the bank is in trouble, hence the massive withdrawal of deposits). That would generate situations where solvent banks close, while other banks survive even though they would not survive 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 pro-cyclical 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 the 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.

Market discipline

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 (2002) and Hosono (2004). Hamalianen et al. (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.

Recognition or monitoring stage

Morgan and Stiroh (2000), Hamalianen et al. (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.[1] 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.

Control or influence stage

This phase has two sub-phases: The first is a natural extension of investors' behaviour from recognition phase; 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, that is, 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, sometimes, banks reacted to adverse market signals by shifting into less-disciplinary (e.g. uninsured deposits) funding sources when problems arose. 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 analyse the effectiveness of market discipline and guide future research on the role of market discipline in bank regulation. Secondly, it 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. As a result, they 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.

[1] Successful market discipline also requires investors to process the information correctly (Crockett, 2000) otherwise inaccurate signals will be transmitted to banks.

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.

Model specification

In this section, we specify our empirical model for determination of the effectiveness of market discipline. To evaluate the effectiveness of market discipline, we estimate two sets of models 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 changing their behaviour.

Market/depositor monitoring of bank risk[2]

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).

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*

$$R_{it} = \beta_0 + \beta_1 FUND_t + \beta_2 Z_t + \beta_3 Y + \beta_4 COB + \varepsilon_t \quad \text{.....1}$$

$$D_{it} = \lambda_0 + \lambda_1 FUND_{(t-1)i} + \lambda_2 Z_t + \beta_3 Y + \lambda_4 r + \lambda_5 COB + \omega_t \quad \text{.....2}$$

Where R_{it} and D_{it} are the interest rate charged on deposits and deposit growth in bank *i* at time *t*, respectively. 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.[3] *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.

[2] This section draws heavily from Barajas and Steiner (2000).

[3] he 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.

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, 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 liquid assets to the total assets 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 se, it is widely 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 = non-performing loans/total loans and advances
CAP = shareholders' fund/risk weighted assets
PROV = loan loss provisions/total non-performing loans and advances
LIQ = liquid assets/total assets
ROA = 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 state-owned and zero otherwise; *FOREIGN*, takes on the value 1 if a bank is foreign owned and zero otherwise. A bank is considered state-owned if the state has a controlling shareholding in the bank. In the same vein, a bank is considered foreign 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 variables to capture this event. 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 of the overall public confidence on the banking system rather than how individual bank risk characteristics influences deposits. *Z* is a vector of macroeconomic variables made up of growth rate of real gross domestic product (RGDP) (for deposit growth equation only), 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, hence for market discipline, we would expect a negative coefficient in the first equation and a positive coefficient in the second equation. Actually, ROA as a measure of profitability does not capture bank risk but this variable, together with capital ratio, 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 few branches. This is because the banks with more branch networks have lower transaction costs compared with banks with just a 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 as 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 the banking public will improve; 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, 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 captures returns in an alternative investment, the stock market. It is expected that the higher the returns, the more likely that investors will prefer investing their investible funds in stocks over keeping them at the banks. Deposit growth and interest rates will, therefore, be negatively related and positively related to COB, respectively.

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 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 (2002) 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 influences bank behaviour. Calomiris and Powelll (2000) explore this issue by testing whether there is tendency for individual banks' 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.

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 banks' ability to recover and has a strong effect in preventing future financial distress.

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

We, therefore, adopt the Calomiris and Powell (2000) 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:

$$(R_{it} - R_{(t-1)i}) = \pi + \alpha R_{(t-1)i} + \beta_i + f_t + \varepsilon_{it} \quad \text{.....3}$$

Where R_{it} is the deposit interest rate paid by bank i on quarter t, β_i and f_t are fixed and time effects, respectively, and ε_{it} is an error term; i and t refer to individual bank and time, respectively.

This is equal to testing for:

$$R_{it} = \pi + (1+\alpha)R_{(t-1)i} + \beta_i + f_t + \upsilon_{it} \quad \text{.....4}$$

The coefficient α 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 α coefficient to be –1 whereas if there is no reversion at all then we expect the α to be zero in (4) above.

Estimation procedure and data requirements

We use ordinary least squares to estimate (1) and (2). 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 β*s* and the *λs* are individually or jointly different from zero. We shall estimate various versions of (1) and (2). First, we distinguish among different measures of deposits, that is, 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 to 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 costs of having funds trapped in failing banks through payment uncertainty and delays. This fear is very real in Nigeria, where some failed banks depositors are yet to get their funds due to delays caused 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 banks' 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 below the median levels for all banks in a sample period. The rest are regarded as unhealthy banks.

Furthermore, using (1) and (2), 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) 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. This may act as a wake-up call for depositors. This exercise will assist us analyse 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 4 is a dynamic process and estimating dynamic models that include 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 estimatesno longer produce

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 a marked advantage in that it is 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 α 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 bases. In general, most of the bank-specific and the macroeconomic indicators are available at annual frequencies over a long timespan. 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 timespan of the study. The analysis therefore uses quarterly observations and covers the period 1995.1 to 2004.4. A total of 63 banks amounting to 2,520 quarterly bank observations were included in the sample.

Table 3 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 asset risk capitalization, liquidity and deposit growth.

5. Empirical results

The results of our estimations are presented in two parts. The first part has 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 s reflected in the dynamic response of banks to the disciplining signals sent by depositors depicted in the first part.

Table 3: 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
Total Deposits (N'm)	15,210	14,290	5,783	3,450	17,200	5,300	30,079	17,500
Profit before Tax N'm	350	220	156	97	520	200	1,020	530
Total Loans/ Adv.N'm	10,500	8,240	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 Provision N'm	840	780	504	322	650	491	2,255	950

continued next page

Table 3 Continued

Variable	1995 - 2004		1995 - 1997		1998 - 1999		2000 - 2004	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Int. Expenses	284	295	299	231	420	491	1,626	2,051
Capital/RW-Assets (%)	12.5	8.5	17	9	10.1	6.2	18.7	10.5
LiquidAsst./ Total Asst (%)	54.3	60.4	35.7	38.5	48.3	40.1	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-perfrm 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 computation

Market monitoring

This section examines the responsiveness of bank deposit growth and interest rates to bank risk taking. The regression estimates for the deposit growth equations are reported in Table 4. Here, we used three measures of deposits, that is, total deposit, time deposits and inter-bank deposits. With respect to total deposit, although bank capitalization and liquidity are the only significant fundamentals, all other fundamental variables, though, are correctly signed. 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. Liquidity (LIQ) is positively signed and significant for all the deposit equations indicating that depositors are very much concerned about the liquidity of their banks. Asset quality (NPL), though correctly signed, is 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 significant only for the inter-bank deposit growth equation.

Table 4: Result of panel regression for deposit growth (1995.1-2004.4)

Variable	Dependent Variable: Growth in Deposits		
	Total Deposit	**Time Deposit**	**Inter-bank Deposit**
Constant	**0.352*** ** (10.550)	**-0.534*** ** *(9.450)*	**-2.630*** ** *(17.530)*
NPL_{t-1}	**-0.211** *(0.351)*	**-0.135** *(-0.985)*	**-0.350*** ** (5*.880)*
$PROV_{t-1}$	**0.001** *(0.001)*	**0.001** *(0.001)*	**0.232** ** (2.388)
CAPt-1	**0.391** ** *(3.574)*	**0.326*** ** *(7.445)*	**0.451*** ** (9.980)
ROA_{t-1}	**0.271** (1*.005)*	**0.392** ** (3.115)	**0.001** (0.010)
LIQ_{t-1}	**0.274** ** (2.995)	**0.195** ** *(2.550)*	**0.478*** ** (9.995)
r	**0.001** *(0.001)*	**0.155** (0.875)	**-0.001** (0.000)
BRANCH	**0.348** ** *(3.550)*	**0.284** ** (2.795)	**0.110** (0.010)
STATE	**0.014** *(0.150)*	**0.002** (0.350)	**0.001** *(0.001)*
FOREIGN	**0.002** *(0.030)*	**0.001** (0.001)	**0.001** *(0.009)*
COB	**-0.410*** ** (7.510)	**-0.420*** ** (9.750)	**-0.101** (0.001)
Log Assets	**0.485*** ** *(10.250)*	**0.395*** ** (8.240)	**0.291** ** (3*.420)*
RGDP	**0.311*** ** *(15.256)*	**0.265*** ** (8.560)	**0.203** ** (4.112)
INF	**-0.101** ** *(2.554)*	**-0.135** ** (2.433)	**-0.022** (0.111)
ASI	**-0.179** ** **(2*.555)*	**-0.277*** ** **(***9.450)*	**0.015** *(0.110)*

continued next page

Table 4 Continued

Variable	Dependent Variable: Growth in Deposits		
	Total Deposit	**Time Deposit**	**Inter-bank Deposit**
Adj. R^2	*0.690*	*0.750*	*0.755*
F-Statistic	19.90	13.50	22.25
No. of Obvs	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

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 depositors' 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.

With respect to dummy variables that account for ownership, whether banks are foreign or locally owned seem to have no effect on 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 fails 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 5: Result of panel regression for deposit interest rates (1995.1-2004.4)

Variable	Dependent Variable: Interest rates on deposits		
	Interest rate on savings deposit	**Interest rate on time deposit**	**Interest rate on inter-bank deposit**
Constant	**-0.025** (10.664)	**0.196** (7.901)	**0.721** (6.4319)
NPL	**0.152** (1.011)	**0.081** *(0.936)*	**0.504***** *(5.622)*
PROV	**0.175** (0.420)	**0.001** *(0.724)*	**-0.154** (1.927)
CAP	**-0.475***** (7.255)	**-0.215***** (2.922)	**-0.314**** *(4.012)*
ROA	**-0.025** *(0.460)*	**-0.045** (0.111)	**-0.108** (1.250)
LIQ	**-0.134** (0.611)	**-0.275***** (5.679)	**-0.107**** (2.397)
BRANCH	**-0.002** (0..158)	**-0.019** *(0.211)*	**-0.011** *(0.012)*
STATE	**0.072** (0.325)	**0.009** *(0.003)*	**0.001** *(0.031)*
FOREIGN	**0.019** (0.24)	**0.177** *(1.287)*	**-0.045** (0.523)
Log Assets	**-0.211*** (2.781)	**-0.244*** (2.555)	**-0.022**** *(3.545)*
COB	**0.024** *(0.055)*	**0.252**** *(2.940)*	**0.019** *(0.950)*
INF	**0.292**** *(3.557)*	**0.399**** *(3.240)*	**0.299**** *(3.152)*
ASI	**0.010** *(0.001)*	**0.285**** *(2.985)*	**0.007** *(0.004)*
Adi. R – Squared	**0.655**	**0.690**	**0.749**
F – Statistic	**17.25**	**27.10**	**22.22**
No. of Obs.	**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

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

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. The results of the panel regressions for the interest rate equations are shown in Table 5. Only the bank capitalization variable is significant across board. However, interest on inter-bank deposits responds positively and significantly to asset quality, while responding negatively and significantly to 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 inter-bank 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 may have greater incentive to monitor themselves in view of the fact that their deposits are not insured. In addition, banks tend to have relative information advantage on other banks' risk characteristics than other private depositors and may have more technical and human capacity to monitor and analyse such risks.

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 affect 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 is 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, save for the time deposit equation. This goes further to support the fact that bank interest rates do not respond to public perception as seen in the results of bank response equations.

Market discipline and banking crises

Banking crises are unique episodes to examine market discipline. The risks of bank failures and losing deposits become more evident and 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 tranquillity. In this analysis, we identify the period between 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 have not occurred in any particular year in the history of Nigerian banking.

Tables 6a and 6b show the regression results for the three sub-periods. Total deposit growth, deposit interest rate, time and inter-bank deposit 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-crises periods (column 2 and 3 of Table 6), 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 and 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-crises era (column 6 and 7), depositor sensitivity to bank insolvency risk as represented by the bank fundamentals seems to persist as the more fundamental variables become significant. Time and inter-bank deposits become even stronger after the crises, suggesting that these deposits continue to respond to bank fundamentals (Table 7). The overall evidence tends to support the hypothesis that banking crises acted as a wake-up call for depositors in monitoring the risk behaviour of their banks. In general, depositor behaviour in the post crisis era appear to be consistent with market discipline as more fundamental variables are individually significant and of the expected signs and the F-Statistic is larger in the post crisis period than in the pre-crisis period.

Although bank fundamental variables were relatively weak in explaining deposit growth and interest rate changes in banks during the pre-crises 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 responsibilities during banking crises when some of them actually lose funds to distressed and failed banking institutions. The experiences of 1998, where the depositors of the 26 failed banks have their deposits trapped in the failed institutions, tend to awaken the interest of depositors to the risk behaviour of their banks. Although the NDIC promised to assess depositors fund in the failed institutions with a view to paying the insurance coverage, many people did not have confidence in a corporation that may not respond in time to avoid inflation eating into their funds.

Table 6: Results of the panel regressions for growth in total deposit and deposit interest rates before, during and after the banking crises of 1998

Variable	Pre-Crises Period 1995.1-1997.2		Crises Period 1997.3-1999.2		Post Crises Period 1999.3-2004.4	
	Deposit Growth	Deposit Interest Rate	Deposit Growth	Deposit Interest Rate	Deposit Growth	Deposit Interest Rate
Constant	0.410 (2.214)	**0.194** (7.023)	**0.543** *(2.005)*	**0.741** ***(2.780)***	**0.341** *(6.788)*	**0.633** (7.023)
NPL	**-0.156** (0.103)	**0.025** (0.094)	**-0.394***** (5.739)	**0.325***** ***(9.254)***	**-0.225**** *(2.250)*	**0.223**** (2.678)
PROV	**0.001** (0.002)	**-0.001** (0.005)	**0.002** (0.011)	**-0.081** ***(1.001)***	**0.081** *(1.001)*	**-0.021** (0.044)
CAP	**0.136*** (2.385)	**-0.255*** *(2.194)*	**0.728***** *(10.399)*	**-0.529**** **(3.213)**	***0.328***** (10.119)	**-0.455***** (7.996)
ROA	**0.005** *(0.001)*	**-0.005** (0.003)	**0.322***** *(5.411)*	**-0.221***** **(7*.405)***	**0.211**** (2*.940)*	**-0.031** (0.032)
LIQ	**0.020** *(0.090)*	**-0.022** (0.031)	**0.180** (0.197)	**-0.015** **(0.019)**	**0.312***** (4.087)	**-0.533***** (5.897)
r	**0.123** *(0.213*)	-	**0.794***** (11.006*)*	**-**	**0.189** (0.451)	-
BRANCH	**0.376**** *(3.612)*	**-0.002** (0.001)	**0.041**** (1.005)	**-0.310** **(0.321)**	**0.233*** (1.798)	**-0.002** (0.250)
STATE	**0.003** (0.001)	**0.001** (0.000)	**-0.225**** *(3.004)*	**0.327***** **(5.250)**	**0.011** (0.455)	**0.001** (0.005)
FOREIGN	**0.001** *(0.003)*	**0.001** *(0.012)*	**0.112** (0.227)	**0.020** **(0.022)**	**0.134** (1.022)	**0.002** *(0.000)*
Log Assets	**0.565***** (6.670)	**-0.011** *(0.121)*	**0.253**** *(1.911)*	**-0.371**** **(1.987)**	**0.283**** (2.220)	**-0.297)**** *(2.112)*
COB	**0.245*** (2.557)	**-0.159** (1.004)	**0.319**** (5.278)	**-0.119** **(0.092)**	**0.214**** (4.560)	**-0.045** (1.235)

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Table 6 Continued

Variable	Pre-Crises Period 1995.1-1997.2		Crises Period 1997.3-1999.2		Post Crises Period 1999.3-2004.4	
	Deposit Growth	Deposit Interest Rate	Deposit Growth	Deposit Interest Rate	Deposit Growth	Deposit Interest Rate
RGDP	**0.177**** (1.429)	-	**0.099** *(0.081)*	**-**	**0.099** (0.081)	**-**
INF	**-0.212**** *(2.750)*	**0.610***** *(3.491)*	**-0.315**** *(2.918)*	**0.345***** ***(5.411)***	**-0.455***** (5.763)	**0.355** *(3.550)*
ASI	**-0.294*** (2.942)	**-0.241*** (1.555)	**-0.365**** (3.005)	**-0.199*** **(2.330)**	**-0.392***** (3.900)	**-0.215*** (1.885)
Adj. R^2	0.545	0.479	0.650	0.540	0.770	0.785
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	2514	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

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

Table 7: Results of the panel regression for time and inter-bank deposits before, during and after the crisis

Variable	Pre-Crises Period 1995.1-1997.2		Crises Period 1997.3-1999.2		Post Crises Period 1999.3-2004.4	
	Time Deposit	Inter-bank Deposit	Time Deposit	Inter-bank Deposit	Time Deposit	Inter-bank Deposit
Constant	**0.345**** (3.222)	**0.194***** (7.023)	**0.743***** *(9.535)*	**0.541***** *(10.805)*	**0.647***** *(19.788)*	**0.766***** (12.011)
NPL	**-0.215** (0.415)	**-0.342**** (2.945)	**-0.355***** (7.837)	**-0.335***** *(9.055)*	**-0.323**** *(4.255)*	**-0.532***** (7.578)
PROV	**0.011** (0.115)	**0.119**** (2.554)	**0.021** (0.011)	**0.181** *(0.997)*	**0.043** *(1.321)*	**0.392**** (4.544)
CAP	**0.175***** (4.785)	**0.724***** *(11.954)*	**0.622***** *(10.959)*	0.793*** (10.554)	***0.528***** (7.159)	**0.645***** (10.596)
ROA	**0.115** *(0.993)*	**0.020** (0.128)	**0.212**** *(4.211)*	**0.421**** (3.*095)*	**0.257**** (4.*940)*	**0.131** (0.935)
LIQ	**0.220** *(1.905)*	**0.534**** (3.445)	**0.177** (0.398)	**0.551**** (10.719)	**0.052** (1.287)	**0.533***** (8.597)
r	**0.655**** *(3.973)*	**0.457*** (2.055)	**0.759***** (9.256*)*	**0.251** (1.544)	**0.389*** (2..451)	**0.399*** (2.551)

continued next page

Table 7 Continued

Variable	Pre-Crises Period 1995.1-1997.2		Crises Period 1997.3-1999.2		Post Crises Period 1999.3-2004.4	
	Time Deposit	Inter-bank Deposit	Time Deposit	Inter-bank Deposit	Time Deposit	Inter-bank Deposit
BRANCH	**0.355**** *(3.852)*	0.009 (0.111)	**0.245**** (3.045)	**0.110** (0.821)	**0.433**** (4.790)	**0.002** (0.350)
STATE	**0.001** (0.001)	**0.001** (0.000)	**-0.155** *(1.054)*	**0.217** (1.250)	**0.011** (0.555)	**0.001** (0.002)
FOREIGN	**0.001** *(0.013)*	**0.001** *(0.022)*	**0.112** (0.227)	**0.022** (0.422)	**0.134** (1.022)	**0.002** *(0.000)*
Log Assets	**0.595***** (6.524)	**0.015** *(0.244)*	**0.285*** *(2.911)*	**0.371*** (2.987)	**0.285** (1.220)	**0.497)**** *(4.312)*
COB	**0.259**** (3.557)	**0.259** (1.604)	**0.319**** (5.278)	**0.119** (0.092)	**0.234**** (4.650)	**0.015** (1.522)
RGDP	**0.177**** (3.329)	**0.334*** (2.388)	**0.056*** *(2.081)*	**0.212** (0.798)	**0.512**** (4.081)	**0.211** (1.558)
INF	**-0.278**** *(3.475)*	**0.610***** *(3.491)*	**-0.315*** *(2.448)*	**0.245** *(1.344)*	-0.415*** (5.763)	**0.355** *(0.540)*
ASI	**-0.341***** (4.988)	**-0.142** (1.155)	**-0.265**** (3.125)	**-0.189** (1.340)	**-0.415***** (3.890)	**-0.218** (1.485)
Adj. R^2	0.555	0.545	0.570	0.550	0.670	0.782
F-Statistic	11.55	9.27	24.55	6.45	21.92	7.64
No. of Obs.	2,514	2,514	2,514	2,514	2514	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

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%) and/or non-performing loans to total loan ratio is above the median level for the all banks. Others are considered to be healthy banks. In our sample, identified weak banks range from nine to 15 in different periods of the study.

Table 8: Results of the panel regression analysis by bank health status (1995-2004)

	Healthy banks		Weak banks	
Variable	**Deposit Growth**	**Interest on Deposits**	**Deposit Growth**	**Interest on Deposits**
Constant	**0.560** (3.255)	**0.236** (6.233)	**0.333** (4.520)	**.752** (7.234)
NPL	**-0.135** *(0.022)*	**0.094** *(0.011)*	**-0.294***** (3.155)	**0.254** (0.250)
PROV	**0.001** (0.03)	**0.001** *(0.000)*	**0.031** (0.107)	**0.015** (0.021)
CAP	**0.472**** (2.998)	**-0.129**** (2.854)	**0.376***** (3.150)	**-0.459***** (3.589)
ROA	**0.259**** *(2.550)*	**-0.011** (0.011)	**0.282**** (2.750)	**0.035** (0.025)
LIQ	**0.015** (0.020)	**0.028** *(0.019)*	**0.094**** (1.820)	**0.023** (0.012)
r	**0.099** **(***0.052)*	-	**0.350***** (3.751)	-
BRANCH	**0.223*** *(1.899)*	**0.003** (0.001)	**0.133*** (1.761)	**0.005** (0.004)
STATE	**0.001** (0.001)	**0.010** *(0.011)*	**0.005** (0.010)	**0.001** *(0.002)*
FOREIGN	**0.020** *(0.021)*	**0.008** *(0.020)*	**0.006** (0.02)	**0.011** (0.019)
COB	**0.241*** *(2.240)*	**0.078** (0.885)	**0.259**** (2.005)	**0.159** (0.998)
Log Assets	**0.274*** *(2.298)*	**0.122*** (1.022)	**0.162*** (1.810)	**0.154**** (1.677)
RGDP	**0.289*** *(2.309)*	**-**	**0.209*** *(2.010)*	**-**
INF	**-0.335**** *(3.565)*	**0.286**** (3.049)	**-0.284***** *(4.290)*	**0.219***** (*2.665)*
ASI	**-0.212*** *(1.995)*	**0.295**** (3.080)	**-0.250***** (3.988)	**0.121*** (1.497)

continued next page

Table 8 Continued

	Healthy banks		Weak banks	
Variable	**Deposit Growth**	**Interest on Deposits**	**Deposit Growth**	**Interest on Deposits**
Adj. R^2	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.

Table 8 reports the regression estimates for both healthy and weak banks. For healthy banks, the major determinants of deposit growth are 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 on assets. 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 at the healthy ones. This suggests that depositors are more sceptical about weak banks and are able to discriminate against them.

Evidence of bank responsiveness to depositor 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. 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 Powell (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. 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, 1999.1-2000.4. 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 beef up their capital to meet the new recapitalization requirement. The findings that mean reversion occurs in respect of inter-bank deposits but not in respect of other deposits may reflect the situation where retail deposits (including time deposits) but not inter-bank deposits are covered by insurance, at least on a de facto basis. However, it may be instructive to note that divergence from mean can result from two sources (a) shocks causing divergence from equilibrium, and (b) changes in the portfolio choices in response to market discipline. While our results have been interpreted in terms of (b), it is a challenge for future research to consider other techniques of estimating bank responsiveness such as the VAR methodology suggested by Bliss and Flannery (2002) in order to make a categorical statement about bank responsiveness in Nigeria.

Table 9: Fixed-effects regressions (time deposit interest rates)*

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	0.004	0.450	0.025
	(0.05)	(0.03)	(0.04)	(0.04)
Adj. R^2	0.45	0.55	0.39	0.40
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 tables 9 and 10.

Table 10: Fixed-effects regression (inter-bank interest rates)*

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 4 2005.1-2005.4**
$r_{i\,t-1}$	-1.195	-0.65	-0.77	-0.95
	(0.05)	(0.03)	(0.04)	(0.04)
Adj. R^2 0.47	0.45	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

6. Policy implication and conclusion

Market discipline and traditional banking supervision are complementary. On the one hand, market discipline may enhance supervisory discipline, on the other, regulations and supervision can enhance market discipline. This is because market and supervisors may have different information set, thus may rely on each other for their complete effectiveness. For example, 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, 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. Other countries ask banks to publish required liquidity levels and their 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.[4] 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 gone as far as to construct lists of authorized bank auditors 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.

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, 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 receives 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. 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.

[4] The 2001 foreign exchange roundtrip in which a number of banks were suspended is a typical example.

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.

In conclusion, this study raises 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 addressed 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 are consistent with the hypothesis that depositors do monitor their banks' risk behaviour. The CAP variable can be seen as a summary statistic for the probability of bank failure and since it is consistently significant in all the equations, it may be interpreted as evidence of market monitoring. Although inter-bank interest rates respond to bank fundamentals, 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, the results of bank response model are less affirmative. Only inter-bank deposits interest rates tend to revert to their means. In any case, they do so at a very low speed.

Thus, although the traditional test of market discipline, which examines the sensitivities of deposit growth and interest rate to bank fundamentals show evidence of market discipline, the result is a little more complicated. The lack of evidence of strong bank response to signals implied by deposit response do in fact limit the efficacy of market discipline in Nigerian banking system. This throws up the issue of why banks do not strongly respond to depositor signals: Could it be that deposits constitute only a small portion of banks' total funding? What are the other sources of funding to DMBs and how strong and consistent are these sources? These and many more questions will form the basis of future research.

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