

**UNIVERSITY OF GHANA**

**STRESS TESTING, DISCLOSURE AND RISK-TAKING OF BANKS IN GHANA**

**BY**

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## DECLARATION

I, Lydia Kuranchie-Pong, do hereby declare that this work is the result of my own research and has not been presented by anyone for any academic award in this or any other university. All references used in this work have been fully acknowledged.

I bear sole responsibility for any shortcomings.

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## CERTIFICATION

I hereby certify that this thesis was supervised in accordance with procedures laid down by the University.

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## DEDICATION

This work is dedicated to the Almighty God for his grace, my parents, Mr. John Kuranchie-Pong and Ms Mary Kwantwi, to Mr. Augustine Addo and all my siblings for their love and supports.



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## TABLE OF CONTENT

DECLARATION.....	i
CERTIFICATION.....	ii
DEDICATION .....	iii
ACKNOWLEDGEMENT.....	iv
TABLE OF CONTENT .....	v
LIST OF TABLES .....	ix
LIST OF FIGURES.....	x
ABSTRACT .....	xi
CHAPTER ONE.....	1
INTRODUCTION.....	1
1.1 Background Of The Study .....	1
1.2 Statement Of The Problem .....	4
1.3 Research Objectives.....	6
1.4 Research Questions.....	6
1.5 Significance Of The Study.....	6
1.6 Scope Of The Study.....	7
1.7 Definition Of Terms .....	7
1.8 Chapter Disposition .....	8

CHAPTER TWO.....	9
LITERATURE REVIEW .....	9
2.1 Introduction.....	9
2.3 Theory Of Corporate Disclosure And Reporting Regulation .....	9
2.3.1 Firm Specific Benefit Of Disclosure.....	10
2.3.2 Firm-Specific Costs Of Corporate Disclosures.....	11
2.3.3 Market-Wide Effects.....	12
2.4 Stress Testing.....	13
2.4.1 Nature And Objectives Of Stress Testing .....	14
2.4.2 Importance Of Stress Testing.....	16
2.5 Disclosure .....	17
2.5.1 Nature Of Disclosure .....	18
2.5.2 Arguments For Regulation Of Financial Reporting And Disclosure Activities .....	19
2.5.3 Measuring Disclosure .....	21
2.6 Risk – Taking Of Banks .....	22
2.6.1 Market Discipline.....	22
2.6.2 Measurement Of Risk .....	24
2.7 Review Of Previous Studies .....	25
2.7.1 Stress Testing .....	25
2.7.2 Disclosure And Risk -Taking.....	34

CHAPTER THREE.....	43
RESEARCH METHODOLOGY .....	43
3.1 Introduction.....	43
3.2 Data Sources .....	43
3.3 Population And Sampling.....	44
3.4 Risk -Taking Behaviour By Ghanaian Banks.....	44
3.5 Relationship Between Disclosure And Risk- Taking Of Banks .....	44
3.5.1 Panel Model .....	45
3.5.2 Panel Model Assumption .....	45
3.5.3 Heteroscedasticity And Autocorrelation.....	45
3.5.4 The Hausman Specification Test .....	46
3.6 Variables .....	47
3.7 Dependent Variable .....	47
3.8 Independent Variable.....	49
3.9 Control Variables.....	50
3.9.1 Bank Size .....	50
3.9.2 Profitability .....	51
3.9.3 Liquidity Ratio .....	51
3.9.4 Treasury Bill Rate .....	52
3.10 Table 3.1 Variables And Predicted Relationship With Z-Score.....	52
3.11 Relationship Between Stress-Test Results And Subsequent Risk Taking Behaviour Of Banks In Ghana .....	53

CHAPTER FOUR .....	56
DATA PRESENTATION AND ANALYSIS .....	56
4.1 Introduction.....	56
4.2 Risk –Taking Behaviour Of Banks In Ghana .....	56
4.3 Disclosure And Risk-Taking Of Banks In Ghana .....	57
4.3.1 Descriptive Statistics .....	57
Table 4.1 Descriptive Statistics Of The Variables.....	58
4.3.2 Correlation Analysis .....	58
4.3.1 Model Diagnostics .....	59
4.4 Regression Results .....	60
CHAPTER FIVE .....	71
SUMMARY, CONCLUSION AND RECOMMENDATIONS .....	71
5.1 Introduction.....	71
5.2 Summary.....	71
5.4 Recommendations .....	74
References .....	76
APPENDICES .....	85

## LIST OF TABLES

Table 3.1 VARIABLES AND PREDICTED RELATIONSHIP WITH Z-SCORE	52
Table 4.1 DESCRIPTIVE STATISTICS OF THE VARIABLES .....	58
Table 4.2 CORRELATIONS FOR THE VARIABLES.....	59
Table 4.3 HAUSMAN SPECIFICATION TEST RESULT .....	59
Table 4.4 MODIFIED WALD TEST FOR GROUP-WISE HETEROSKEDASTICITY IN FIXED EFFECT REGRESSION MODEL .....	60
Table 4.5 WOOLDRIDGE TEST FOR AUTOCORRELATION IN PANEL DATA.....	60
Table 4.6 REGRESSION MODEL RESULTS.....	61
Table 4.7 BANKS PARTICIPATION IN THE STRESS TEST BY THE BANK OF GHANA .....	66
Table 4.8 FREQUENCY OF PARTICIPATION BY BANKS .....	66

## LIST OF FIGURES

Figure 4.1 RISK-TAKING BEHAVIOUR OF BANKS IN GHANA.....	56
Figure 4.2 AWARENESS OF STRESS TEST BY BANK OF GHANA.....	66
Figure 4.3 DURATION OF GETTING STRESS TEST RESULT FROM BANK OF GHANA.....	67
Figure 4.4 INTERNAL STRESS TEST UNDERTAKEN BY INDIVIDUAL BANKS.....	68
Figure 4.5 FACTORING STRESS TEST RESULT INTO RISK MANAGEMENT POLICIES.....	69

## ABSTRACT

The occurrence of the global financial crisis has caused stress testing to receive much attention by regulators, bank management, rating agents and many others in the banking industry. Many investors lost confidence in the banking system after the occurrence of the global financial crises. The central banks have been employing stress testing to restore the confidence in the banking system in their countries. Stress testing is now a popular risk management tool. It is in this light that this study investigates the effect of stress testing, and disclosure on risk-taking of banks in Ghana for the period 2007-2011.

The study made use of a panel regression model and relate risk-taking to disclosure, controlling for bank size, profitability, liquidity and treasury bill rate. Disclosure scores from a disclosure index are used to proxy for disclosure, likewise Z-score to proxy for total risk. Each control variable was dropped at a time to serve as a robust test of the regression result. The study also obtained primary data on stress testing to investigate stress test results influence on subsequent risk-taking behaviour of banks.

Contrary to expectation, the regression results indicate that greater disclosure is associated with more risk-taking while lesser disclosure is associated with reduced risk-taking. Also, it was found that bank size is not important in influencing risk-taking behaviour of banks in Ghana. Besides, the researcher introduced treasury bill rate as a control variable for the first time and the results are economically meaningful and as well as statistically significant in influencing risk-taking of banks in Ghana.

Again, the results reveal that greater percentage of the sample banks do not receive stress test results from the central bank (Bank of Ghana) hence relies mainly on their internal stress test results to influence their risk management policies. Also, not all the banks conduct internal

stress test exercise. Stress testing is therefore a new phenomenon in banking industry of Ghana.

Due to the occurrence of recent financial crises, stress testing, disclosures of information by banks to stakeholders have become very important. However, this is an area not researched in the Ghanaian context and a contribution to literature in this area and for policy makers is laudable. This study therefore, will broaden the approach and the design that can be used to research into the topic. Also, it will serve as a reference for future researchers to contribute to this area.

## CHAPTER ONE

### INTRODUCTION

#### 1.1 Background of the Study

The occurrence of the global financial crisis has caused stress testing to receive much attention by regulators, bank management, rating agents and many others in the banking industry (Blaauw, 2009). Stress testing is now a popular phenomenon of the banking industry in recent years. In all advanced economies stress-testing is a standard tool of banking supervision (Bischof & Daske, 2012).

Stress tests are quantitative tools used by central banks for assessing the soundness of financial system in the event of extreme, but still plausible, shocks. Stress testing is a risk management technique used to evaluate the potential effects on an institution's financial condition, of a set of specified changes in risk factors, corresponding to exceptional but plausible events (OSFI, 2009).

Stress testing involves scenario testing and sensitivity testing. The purpose of stress testing program includes risk identification and control, providing a complementary risk perspective to other risk management tools, supporting capital management and improving liquidity management (OSFI, 2009).

Financial information is needed by all stakeholders so as to make an informed judgement and decision. According to Putu et al. (2012), technically, information disclosure forms an integral part of financial reporting. Conceptually, the process of accounting to present information in the form of a full set of financial statements ends with disclosure of information. The information disclosed in annual reports is basically grouped into two main categories, namely, (1) mandatory disclosure and (2) voluntary disclosure (Putu et al. 2012).

Mandatory disclosure is the minimum information that must be disclosed and compulsory as stipulated by the regulations. The “voluntary disclosure regards information made public through the firm’s free choice” (Papo, 2008). According to Huiyun & Peng (2012), voluntary disclosure refers to the activity of voluntarily revealing information in addition to that required by regulators.

Market discipline has become a prominent topic in discussions of the banking industry in recent years. Market discipline is the idea that the actions of shareholders, creditors, and counterparties of banking companies can influence the investment, operational, and risk-taking decisions of bank managers (Flannery, 2001; Bliss & Flannery, 2002; Hirtle, 2007). Bank supervisors have embraced the concept of market discipline as a supportive measure to supervisory and regulatory tools for monitoring risk at individual banks and systemic risk in the banking system as whole (Hirtle, 2007). Sufficient information disclosure is a necessary condition for efficient market discipline.

The question as to whether bank- specific stress-test results and risk exposures should be mandatorily made public has become a bone of contention for some stakeholders. Regulators and academics have since long debated about the role of supplementary bank disclosures during a financial crisis (Bischof & Daske, 2012). One group is with the view that financial market uncertainty may increase when disclosed items turn out to be unfavourable to the bank or the financial institution.

Another group also has the view that negative effects of mandatory disclosure are likely to discipline bank managers to reduce excessive risk-taking or expand voluntary risk reporting (Bischof & Daske, 2012). Bank is a risk taking enterprise hence as part of good corporate

governance, it is expected to release relevant risk – related information to the marketplace (Linsley & Shrives, 2005).

Effective risk management is critical to sustaining banks growth and profitability. Shareholders and other interested parties are expected to contribute to effective risk management in the banking industry through market discipline. This therefore calls for stakeholders to assess the risk profile of a bank. Stakeholders need sufficient disclosure of risk related information by banks so as to assess the risk profile of the banks in order to make an informed decision in contributing to effective risk management. There is a concern as to whether the banks are disclosing sufficient risk information to the marketplace.

Obviously, control of banks and financial institutions is not conducted only by shareholders but also investors or depositors, creditors and the central bank as indicated above. Similarly in Ghana, the Bank of Ghana controls the activities of banks and financial institution through its regulations. As a supportive effort to achieve this purpose, Bank of Ghana has been conducting stress-testing exercise, as done by central banks worldwide, to check the soundness of financial systems employed by the various banks in Ghana. However, in Ghana the result of the stress testing is not disclosed to the general public but to the individual banks as and when it becomes necessary. The question as to whether the stress testing results released by Bank of Ghana to the banks induces their subsequent risk exposures is an important aspect of the test that is worth considering. Undeniably, the extent to which the banks make use of the stress test result is another aspect that may improve risk management of banks.

## 1.2 Statement of the Problem

The banking industry is expanding with many new banks joining the industry in Africa, and Ghana for that matter. Therefore, the banks are adding more quality to their services so as to be unique and attractive to existing and prospective customers. As indicated above, effective risk management is very critical to sustaining banks growth and profitability, in that banks are risk taking enterprises. Shareholders and other interested parties are expected to contribute to effective risk management in the banking industry through market discipline.

Existing theory establishes a disciplining mechanism of transparency on banks' risk-taking either through market monitoring and pricing or through limiting regulatory forbearance of captured regulators (Flannery, 2001). Theory of disclosure indicates that greater disclosure and enhanced market discipline leads to reduced risk-taking. However, little empirical work have been done to examine the influence of disclosure on risk-taking in the banking industry (Nier & Baumann, 2003; Hirtle, 2007; Bischof & Daske, 2012).

Over the years, researchers have focused on factors influencing voluntary disclosure (Huiyun & Peng, 2012), voluntary disclosure and earnings management at bank (Putu et al. 2012), determinants and consequence of voluntary disclosure (Wang et al. 2008), the extent of disclosure in annual reports of banking companies (Hossian, 2008), mandatory supervisory disclosure, voluntary disclosure and risk taking of financial institutions (Bischof & Daske, 2012), public disclosure, risk and bank performance (Hirtle, 2007), market risk disclosures of banks (Savvides & Savvidou, 2012), bank governance, regulation and risk taking (Laeven & Levine, 2009), transparency and the disclosure of risk information in the banking sector (Linsley & Shrivs, 2005), and efficiency and risk-taking behaviour of Ghanaian banks (Isshaq et al. 2012).

Several papers have also examined the impact of disclosure using equity trading characteristics such as price volatility or bid asked spread as proxies for risk (for example Bischof & Daske, 2012, Bushee & Noe, 2000).

Though credit risk exposure is the major risk exposure in the banking industry, previous researchers have focused on market risk (e.g., Hirtle, 2007; Savvides & Savvidou, 2012). Arguably, there is little empirical work on disclosure in general and risk-taking.

Therefore, one of the research gaps that this study seeks to fill is to examine the influence of disclosure on risk-taking of banks in Ghana. Also, there exist a contextual gap in that, most of these related empirical research are conducted in the developed countries using the setting pertaining there, whereas the phenomena is widespread.

Again, the main essence of the central bank's (Bank of Ghana) stress test exercise is to advice the banks to make the necessary adjustment in their risk taking behaviour (Blaauw, 2009). However, little empirical work has been done to find the influence of stress testing on risk taking of banks. Researchers have focused on macro financial stress testing: principles and practices (Oura, 2012), stress testing banks (Schuermann, 2012), stress testing financial systems (Sorge, 2004) and most recently taking the mystery out of stress testing (Nayda, 2012). There is a research gap to verify whether the stress testing result indeed induces subsequent risk-taking behaviour of banks.

Another research gap that this study seeks to fill is to investigate whether banks in Ghana use stress tests results as a risk management tool to make an informed risk management and business decisions. Again, most of the empirical studies relating to the topic were conducted in the developed countries and there exist a contextual gap as far as a developing country like

Ghana is concerned. There is therefore the need to investigate these aspects in a developing region like Africa, laying particular emphasis on Ghana.

### **1.3 Research Objectives**

The objectives of the study are:

- i. To find the risk taking behaviour of banks in Ghana, from 2007 - 2011.
- ii. To establish the relationship between disclosure and subsequent risk taking.
- iii. To find whether the central bank's (Bank of Ghana) stress test results released to the banks induces their subsequent risk-taking.

### **1.4 Research Questions**

Following the objectives of this study which have been provided above, the following research questions are here-by posed;

- i. What is the general risk taking behaviour of Ghanaian banks for the period 2007-2011?
- ii. What is the relationship between disclosure and risk- taking behaviour of banks in Ghana?
- iii. Do stress-test results influence the subsequent risk taking behaviour of banks in Ghana?

### **1.5 Significance of the Study**

Bank supervisors have embraced the concept of market discipline as a supportive measure to supervisory and regulatory tools for monitoring risk at individual banks and systemic risk in the banking system as whole (Hirtle, 2007). Whether this concept will work or not is mostly dependent on disclosure of information. Stress testing has become a popular risk management tool in this era. Stress testing, disclosure and risk taking of banks in Ghana is the focus of this study. Concentration of researchers have been on the information content of supervisory bank disclosures, market monitoring and the sensitivity of banks' cost of financing to risk-taking

and market risk. Arguably, there is remarkably little empirical evidence as to whether stress testing result induces a bank's risk-taking behaviour. This study will add to the knowledge on the influence of stress testing on risk-taking behaviour of banks in the Ghanaian contest. It will also provide an insight as to whether the banks in Ghana are disclosing relevant risk information to their stakeholders, as stated in Bank of Ghana Statutory Audit Report and Disclosure Requirements, and IFRS 7 Disclosure Requirement, for market discipline to work effectively. Again the study will bring to bear whether bank stakeholders are contributing to efficient risk management in the banking industry. The study will also serve as a guide to appropriate authorities as to how the stress test result can be regulated and the need to strengthen enforcement of statutory disclosure compliance.

### **1.6 Scope of the Study**

Most of the empirical research work relating to stress testing, disclosure and risk taking of banks are conducted in the developed countries using the setting pertaining there, whereas the phenomena is widespread. Empirical study in this area is highly required especially in Africa. Due to constraints of time and access to data, this study is limited to banking industry in Ghana. Also banks that have been in operation from 2007 to 2011 will be considered. Again, this study is limited to the stress test conducted by Bank of Ghana.

### **1.7 Definition of Terms**

Stress Tests are quantitative tools used by central banks for assessing the soundness of financial system in the event of extreme, but still plausible, shocks.

Mandatory disclosure is the minimum information that must be disclosed and is compulsory as stated by the regulations (Putu et al. 2012).

Mandatory disclosure “refers to those aspects and information which must be published as a consequence of the existence of some legal or statutory stipulations, capital markets, stock-exchanges commissions or accounting authorities regulations” (Papo, 2008) .

The “voluntary disclosure regards information made public through the firm’s free choice” (Papo, 2008).

Voluntary disclosure is information disclosure beyond what is required. This disclosure is a free choice of management of company to provide accounting information and other information considered relevant for users to make decision (Putu et al. 2012).

### **1.8 Chapter Disposition**

The study is organized into five (5) main chapters. Chapter one is made up of background to the study, problem statement, the objectives, research questions, and the significance of the study as well as the scope of the study. Chapter two covers the related literature review on the study mainly from related journal publications in the area. Chapter three looks at the methodology or framework adopted in the study, providing relevant information on data sources, and how the data was analysed. Chapter four discusses the findings of the study. Chapter five provides the summary, conclusions and recommendations which are based on the findings derived in the preceding chapter.

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1 Introduction

The discussion of the literature on stress testing, disclosure and risk-taking by banks considers the general theory of disclosure and risk-taking, theory of corporate disclosure and reporting regulation, definitions, nature and importance of the subject matter. This is followed by a review of the empirical literature on stress testing, disclosure and risk-taking.

#### 2.2 General Theory of Disclosure and Risk-Taking

There is a strong theory which establishes a disciplining mechanism of transparency on banks' risk-taking either through market monitoring and pricing or through limiting regulatory forbearance of captured regulators (Flannery, 2001). According to Popa (2008), disclosure theory indicates that corporate disclosure is critical for the functioning of an efficient capital market. It is influenced by culture, social, economic and behavioural factors that are specific to each firm.

According to Cheynel (2012), the existing theory of voluntary disclosure and cost of capital indicates that, firms that voluntarily disclose their information have a lower cost of capital than firms that do not disclose. Again, economies with a high disclosure friction feature overinvestment, while those with a low disclosure friction feature underinvestment, and that an increase from a low to a high disclosure friction implies an increase in aggregate investment. Also, mandatory disclosures may increase efficiency only if the initial disclosure friction is relatively high.

#### 2.3 Theory Of Corporate Disclosure And Reporting Regulation

### **2.3.1 Firm Specific Benefit of Disclosure**

Current theories typically focus on direct capital market outcomes of firms' disclosure activities. These market outcomes include liquidity, cost of capital and firm valuation. Verrecchia (2001) argued that, the effect on market liquidity is the firm-specific benefit of disclosure best supported by theory.

Verrecchia (2001) indicated that the major effect of information asymmetries among investors is that it causes adverse selection in the share markets. That is, uninformed investors lower the price at which they are willing to buy, to safe guide the losses from trading with an informed counterparties. He indicates that, the effect of this reduces share markets liquidity (the ability of investors to quickly buy or sell shares at low cost and with little price impact). Ensuring investors have equal information through corporate disclosure can resolve this effect (Verrecchia, 2001).

The reason given to support this notion is that, disclosing more information to the public makes it harder and more costly for traders to become privately informed. Consequently, fewer investors are likely to be privately informed, reducing the tendency of trading with a better informed counter party. Besides, disclosing more information reduces the uncertainty about firm value, which in effect reduces the potential information advantage that an informed trader might have. Both effects reduce the extent to which uninformed investors need to price protect and hence increase market liquidity (Luez and Wysocki, 2008). According to Garleanu and Pedersen (2004), adverse selection can distort investors' trading decisions and result in inefficient and hence costly asset allocations for which investors need to be compensated, leading to a higher required rate of return or cost of capital.

Moreover, according to Baiman & Verrecchia (1996); Verrecchia (2001), adverse selection problems and trading costs in secondary markets fold back to the point at which the firm issues shares. Investors anticipate that they face price protection when they sell shares in the future and hence reduce the price at which they are willing to buy shares in the initial securities offering (Luez & Wysocki, 2008).

Furthermore, information asymmetry and adverse selection in primary share markets can reduce the offering price and lead to under-pricing. Also, according to Luez & Wysocki (2008) some theories provide a direct link between disclosure and the cost of capital (or firm value), without reference to market liquidity (and adverse selection costs). For instance, Merton (1987) develops a model where some investors have incomplete information and are not aware of all firms in the economy. As a result, risk sharing is incomplete and inefficient. Disclosures by these lesser known firms can make investors aware of their existence and enlarge the investor base, which in turn improves risk sharing and lowers the cost of capital.

Corporate disclosures have the potential to change firm value by affecting managers' decisions and hence altering the distribution of future cash flows. Many studies in agency theory suggest that more transparency and better corporate governance increases firm value by improving managers' decisions or by reducing the amount that managers appropriate for themselves. Shleifer & Wolfenzon (2002) is an example of such studies (Luez & Wysocki, 2008).

### **2.3.2 Firm-Specific Costs of Corporate Disclosures**

Luez & Wysocki (2008) indicated that, corporate disclosures are associated with direct cost including the preparation, certification and dissemination of accounting reports, which are intuitively straightforward. Studies like Feltham et al. (1992) and Hayes & Lundholm (1996)

have shown that disclosures can also have indirect costs because information provided to capital market participants can also be used by other parties such as competitors, regulators and tax authorities (Luez & Wysocki, 2008).

One example given by these studies is that, detailed information about line-of-business profitability can reveal proprietary information to competitors. The fact that other parties may use public information to the disclosing firm's disadvantage can dampen its disclosure incentives (Verrecchia, 1983; Gal-Or, 1985). According to Kirby (1988), a competitive threat may not always induce firms to withhold information, in that incumbent firms may disclose information to deter entry by competitors. Also firms may share information about market demand to prevent overproduction in the industry (Luez & Wysocki, 2008).

### **2.3.3 Market-Wide Effects**

Corporate disclosures can be useful to other firms for decision making but it can also help reduce agency problems in other firms. Firms' disclosures of operating performance and governance arrangements provide useful benchmarks that help outside investors to evaluate other firms' managerial efficiency or potential agency conflicts and in doing so lower the cost of monitoring (Luez & Wysocki, 2008).

Nevertheless, there can be negative effects or costly externalities to firms' reporting and misreporting activities as shown by some studies. Fishman & Hagerty (1989) for instance, show that an increase in disclosure by one firm can attract investors away from other firms (e.g., if cost of processing information is high). This effect lowers the price efficiency of other firms and creates a negative externality, particularly in markets that are not perfectly competitive (Luez & Wysocki, 2008). Lastly, an individual firm's misreporting activities may have negative spillovers to related firms, governments, and investors as argued by Sidak

(2003) that fraudulent disclosures and financial reports can send false signals to industry players about new investment opportunities, lead governments to pursue incorrect regulatory policies, and cause capital rationing in the industry.

Without corporate disclosures, investors are unable to distinguish between good and bad firms and therefore offer a price that reflects the average value of all firms (Luez & Wysocki, 2008). Though corporate transparency is important and a recurring policy issue, there is limited research on disclosure and its relationship with risk-taking.

## **2.4 Stress Testing**

Stress-testing at the level of individual institutions has been widely applied by internationally active banks since the early 1990s (Sorge, 2004). Stress testing refers to examinations employed to conduct a forward-looking assessment of the potential effects of various shocks and circumstances on a banking organization (Ware & Shek, 2012).

According to Oura (2012), “Stress testing is “what if” exercises aimed at assessing the vulnerability and resilience of individual banks and/or of the system as a whole against extreme but plausible shocks”. Bank of Ghana in its 36<sup>th</sup> MPC meeting (2009) indicated that, “stress test is commonly described as the evaluation of a bank’s financial position under a severe but plausible scenario to assist in decision making within the bank”.

Stress tests are quantitative tools used by central banks for assessing the soundness of the financial system in the event of extreme, but still plausible, shocks (macroeconomic stress tests). One outcome of 2007-2009 financial crises is that, many investors lost confidence in the banking systems and the central bank can restore and maintain confidence in country's banking system through a transparent system of standardized stress testing. Stress testing

includes scenario testing and sensitivity testing (OSFI, 2009). Scenario analysis involves making assumptions about events that may occur and then considering how those events will affect outcomes for the bank.

#### **2.4.1 Nature and Objectives of Stress Testing**

For stress test to serve its purpose it must be effective. An effective stress testing framework lays out an integrated and forward-looking set of activities that a banking organization must use together with other practices so as to help in identifying and measuring its material risks and vulnerabilities (Ware & Shek, 2012). These vulnerabilities include those that may manifest themselves during stressful economic or financial environments, or from firm-specific adverse events.

An effective stress testing framework should supplement other quantitative risk management practices, such as those statistically estimated using historical data, as well as qualitative practices. Stress testing can therefore help in highlighting unidentified risk concentrations and interrelationships and their potential effects on the banking organization during stressful times (Ware & Shek, 2012).

A banking organization should come out with stress testing framework that commensurate with features of its organization and entire risk profile. According to Ware & Shek (2012), stress testing framework must include well defined objectives, methodologies, well-designed scenarios focused on bank's business and risks, properly documented assumptions to identify potential impact on the bank's financial condition, review of stress testing processes, information disclosure and recommended actions based on stress test results. The framework should be planned to assess the impact of both firm specific and systemic stress events and

circumstance on the bank's operations and financial condition. Stress testing framework must have policies to review and assess its effectiveness. This assessment should improve stress testing to have relevant and current test, comprehensive coverage with sound methodologies and effective use of results (Ware & Shek, 2012).

Stress testing is of two main kinds namely bottom-up test (BU) and top-down (TD) test, IMF (2012). A bottom-up (BU) test is defined as an exercise conducted by individual institutions using their internal data and models, but based on a central bank's or supervisory agency's common assumptions. A top-down (TD) test is an exercise carried out by the central authority, Oura (2012). Each bank's own risk profile is better reflected by a BU test in that, a TD test can impose one methodology to be used. According to Oura (2012), TD tests are conducted more frequently (semi-annual or annual) than BU tests which is conducted usually annually.

The responsibility for stress testing the banking sector lies with the central banks and supervisors and, where applicable, financial market infrastructures. According to Oura (2012), most countries implement solvency stress tests compared to liquidity tests. The processes of liquidity stress tests are broadly similar to those for solvency tests. However, liquidity tests tend to rely more on banks' data and methodologies, and banks are given more flexibility regarding the detailed assumptions. Credit risk is always included in the stress tests.

The exposures mostly examined in stress tests include loans, derivatives, exposures in banking and trading books, and other off-balance sheet items (Oura, 2012). The data mostly used for the test are accounting (balance sheet) and market-based data; however, others basically rely on accounting-based information, from published sources, and/or supervisory

data. Communicating the test results to the general public is not required by most countries; nevertheless, many central banks do communicate the result voluntarily through some measures of distribution in order not to reveal the identity of individual institution.

#### **2.4.2 Importance of Stress Testing**

Stress testing is especially important to avoid complacency and the under-pricing of risk after long periods of sound economic and financial conditions. Stress testing is also a key risk management tool during periods of expansion when new products grow rapidly and for which limited or no historical experience is available (OSFI, 2009). Stress testing is important in that it assist in risk identification and control. Thus, it is used to address institution-wide risks, and consider the concentrations and interactions between risks in stress environments that might otherwise be overlooked, (OSFI, 2009).

Also it serves as a complementary risk perspective tool to other risk management tools. Stress tests complement risk quantification methodologies that are based on, quantitative models and estimated statistical relationships. Specifically, stress testing results provide insights about the validity of statistical models and bring to bear vulnerabilities (eg. unidentified risk concentrations) that could threaten the viability of the institution.

Again, stress testing support capital management in that it forms an integral part of institutions' internal capital management. A rigorous forward-looking stress testing can identify severe events, including a series of compounding events, or changes in market conditions that could adversely impact the institution (OSFI, 2009). Stress testing also improves liquidity management. It is a central tool in identifying, measuring and controlling funding liquidity risks in case of both institution-specific and market-wide stress events.

According to Bank of Ghana's Monetary Policy Analysis and Financial Stability Department 36<sup>th</sup> MPC Meeting, (2009), stress testing is important in that it provides a forward-looking assessments of risk, it overcomes limitations of models and historical data, supports internal and external communication, feeds into capital and liquidity planning procedures, informs the setting of a banks' risk tolerance and facilitates the development of risk mitigation or contingency plans across a range of stressed conditions.

Stress testing is therefore not just useful for micro-prudential supervision (examining the risk of a given bank) but also for macro-prudential supervision by making it possible to discover common risks across banks which otherwise would be undiscovered. A transparent system of standardized stress testing conducted by a central bank can therefore increase and maintain confidence in country's banking system (Blaauw, 2009).

## **2.5 Disclosure**

Bank as a risk taking enterprise is expected to disseminate relevant and significant amount of information publicly to be used by shareholders and other stakeholders. It is suggested that there is insufficient disclosure of risk information by banks and as a result pillar 3 of Basel II lays out a comprehensive framework for risk disclosures to create a possibility for stakeholders to assess the risk profile of a bank. There have been calls on banks for more disclosure of information to enable readers to fully assess the performance of a bank, Linsley & Shrives (2005). This is due to the fact that corporate disclosure is very vital for efficient functioning of capital market. Information disclosed by firms are of various forms namely, regulated financial reports, including financial statements, footnotes, management discussion and analysis, and other regulatory filings (Healy & Palepu, 2001).

A firm may voluntarily communicate through avenues such as analysts' presentations and conference calls, press releases, management forecasts, internet sites, and other corporate reports. Also, information intermediaries such as financial analysts, industry experts, and the financial press do make disclosures about firms, Healy & Palepu (2001).

### **2.5.1 Nature of Disclosure**

Generally speaking, disclosure has become a global issue. According to Cheynel (2012), "disclosure can refer either to mandatory or voluntary release of information about firms' financial positions and performance". As indicated earlier, mandatory disclosure is the minimum information that must be disclosed and compulsory as stipulated by the regulations while voluntary disclosure is information disclosure beyond what is required. Various theories like stakeholder theory, agency theory, legitimacy theory and political economy theory have expressed why corporations should disclose information and why corporations do disclose information (Rouf & Harun, 2011).

The relationship between the principal and the agent has been expressed by the agency theory. According to the agency theory, companies disclose more information to mitigate conflicts between shareholders and managers. That notwithstanding companies increase disclosure to enhance their firm value (Lobo & Zhou, 2001). Generally, disclosure is done in company annual reports either through the statements or notes accompanying the statements.

The annual report is considered as the main source of information to the various users, though there are other means of releasing information (e.g., letters to shareholders and interim reporting). Obviously, the various users have vested interest in the annual reports, for instance, income statement is considered as the section most preferred by investors, just as creditors and bankers are more interested in cash flow statement and the balance sheet (Ho &

Wong, 2001). This implies that, for users to make efficient use of their limited resources, the annual report should contain useful information that will equip them to make sound judgements and decisions.

According to Lundholm and Winkle (2006) conflicts arise when managers disclose or decide to withhold certain information and that voluntary disclosure can be employed to reduce the information asymmetry problems. Barako (2004) argues that managers may focus on their personal interests, hence the need for shareholders to create the mechanisms to mitigate agency problems.

The agency theory suggests that where ownership of a firm is separated from management, there is greater tendency for agency costs to arise because of vested interest of contracting parties. According to Mohd et al. (2006), agency problem is expected to be higher in the widely held companies due to diverse interests contracting parties, as cited in Rouf & Harun (2011). Voluntary disclosure may be employed by managers to signal that they are working for shareholders best interests.

### **2.5.2 Arguments for Regulation of Financial Reporting and Disclosure Activities**

Some researchers have put up arguments to justify the regulation of financial reporting and disclosure activities. The first argument is that corporate disclosures create several externalities, which can lead to private over-or underproduction of information. In theory, disclosure regulation can mitigate this problem by mandating the socially optimal level of disclosure.

A second argument put forth to justify disclosure regulation is that a mandatory regime serves as a low-cost commitment device (e.g., Mahoney, 1995; Rock, 2002). In contrast, disclosure requirements specify which information a firm has to provide and force it to reveal this information in both good and bad times.

A third and closely related argument is that privately producing a sufficient level of disclosure commitment can be very expensive and in many cases even impossible. The penalties that private contracts can impose are generally quite limited. Thus, a mandatory disclosure regime can be beneficial if it offers access to criminal penalties or other remedies that are not available to private contracts.

A potential benefit of a mandatory disclosure regime is that it makes it easier for new entrants to commit and hence to raise capital, which in turn increases competition and reduces social losses from private benefits consumption (Leuz & Wysocki, 2008). It is important to recognize that mandatory disclosure regimes have costs and are not without problems. First, mandatory regimes are costly to design, implement and enforce. Second, incumbent firms have an incentive to capture the regulatory process, e.g., to implement a system that inhibits, rather than promotes competition, which in turn can create substantial indirect costs (Stigler, 1971).

Recognizing these issues, Djankov et al. (2003) propose an enforcement theory of regulation. Their premise is that all strategies to implement a socially desirable policy are imperfect and that optimal institutional design involves a trade-off between imperfect alternatives. They indicated that a coasian implementation, which relies heavily on courts and private litigation, can be quite imperfect, especially when “weapons” are unequal across litigants. Also, another

important factor is the level at which disclosure regulation takes place and hence who is the regulator. It is conceivable to create mandatory regimes at the exchange, state, country or supranational level but each level has its advantages and drawbacks (Leuz & Wysocki, 2008).

### **2.5.3 Measuring Disclosure**

Empiricists find it difficult to objectively measure disclosures because they are mostly qualitative and narrative in nature. Moreover, theoretical research provides little guidance on what form, quantity and frequency of disclosure is relevant for various stakeholders. Yet, there seems to be agreement that timely, relevant, verifiable, reliable, unbiased, comparable and consistent disclosures and financial reports are all desirable properties of corporate disclosures and financial reports (Leuz & Wysocki, 2008).

A widely-used disclosure measure is based on the annual survey of financial analysts' rankings of U.S. firms' disclosure activities by the Association for Investment Management and Research (AIMR) and examples are Lang and Lundholm (1993, 1996); Welker (1995); Healy, et al .(1999); and Nagar et al .(2003). However, these rankings arguably capture the usefulness of firms 'disclosures as perceived by expert users of this information and they are only applicable to a subset of large U.S. firms ranked in the survey during the 1980s and 1990s.

Other studies use measures of disclosure activities constructed by researchers (e.g., Botosan, 1997; Hail, 2003; Francis et al. 2005). These self-constructed measures generally use a check-list of information disclosures in firms' annual reports. The limitations of these types of measures are that the selection and coding of the relevant disclosures are subjective. Other studies focus on the timing and frequency of firms' disclosures such as the frequency and precision of management forecasts of earnings (see Hirst et al .2008), and conference calls

with analysts (e.g., Tasker, 1998; Frankel, Johnson, and Skinner, 1999; Bushee et al. 2003) as indicated in Leuz & Wysocki, (2008).

## **2.6 Risk –Taking of Banks**

Banks, as indicated above are risk taking enterprises. The dominant risk exposures of banks are credit risk, market risk, liquidity risk, interest rate risk, foreign currency risk and legal risk. From Bank of Ghana stress test exercise and the annual reports of sample banks in Ghana, the major risk exposure of the banks is credit risk exposure. It is therefore not surprising that the transparency group of the basel committee on banking supervision (2000) came out with best practices for credit risk disclosure, which stipulate recommended information the banks should disclose concerning credit risk.

According to Leaven & Levine (2009), the risk taking behaviour of banks affects financial and economic fragility. There is therefore a call on the government and all stakeholders of banks to contribute their quotas to ensure efficient risk management at individual bank level and the industry as whole. Stakeholders can make meaningful contribution if the banks are transparent. However, the banking industry is seen as being opaque (Bischof & Daske, 2012).

There is a strong theory which establishes a disciplining mechanism of transparency on banks' risk-taking either through market monitoring and pricing or through limiting regulatory forbearance of captured regulators (Bischof & Daske, 2012).

### **2.6.1 Market Discipline**

The topic of market discipline in banking industry has been given considerable attention in recent years, (Nier & Baumann, 2003; Ghosh & Das, 2000). Market discipline refers to a

market-based incentive scheme in which investors in banking liabilities, such as subordinated debt or uninsured deposits, ‘punish’ banks for greater risk-taking by demanding higher yields on those liabilities (Nier & Baumann, 2003).

Market discipline in the banking sector can be described as ‘private counterparty supervision’ (Greenspan, 2001). There are a number of potential benefits from enhancing market discipline in a country’s banking sector. Firstly, by punishing excessive risk-taking by banks, increased market discipline may reduce moral hazard incentives. Secondly, market discipline may improve the efficiency of banks by pressurising some of the relatively inefficient banks to become more efficient or to exit the industry (Berger, 1991). Thirdly, evidence indicates that markets give signals about the credit standings of financial firms, which, combined with inside information gained by supervisory procedures, can increase the efficacy of the overall supervisory process.

Finally, Flannery (2001) indicated that market discipline might be able to supplement traditional supervisory assessments to distinguish ‘good’ banks from ‘bad’ ones and therefore, lower the overall social costs of bank supervision (Hossian, 2008).

According to Flannery (2001) and Bliss & Flannery (2002), market discipline has two distinct components: investors and creditors’ ability to monitor and assess changes in bank condition, and their ability to influence management behaviour. They indicated that both are affected by the amount and quality of information disclosed. In theory, greater disclosure provides more information on which investors and creditors can make their assessments of firm condition, which in turn makes a significant market reaction to an adverse change in condition – and subsequent management response – more likely and immediate (Hirtle, 2007).

### 2.6.2 Measurement of Risk

Researchers have used several approaches to measure banking risk. As indicated by Nier & Baumann (2003), some of the measures of bank risk are: the ratio of non-performing loans to total loans, the ratio of loan loss provisions charges to total loans, the standard deviation of weekly equity prices, beta and idiosyncratic risk. Both the ratio of non-performing loans and the ratio of loan loss provisions are measures of the bank's credit risk. While a measure of credit risk does not inform on all aspects of risk, credit risk is a major part of total risk for a typical banking institution. The ratio of non-performing loans is a measure of the stock of bad and doubtful loans and summarises the extent of credit risk the bank has taken on in the past. By contrast, the ratio of loan loss provisions is a measure of the flow of new bad loans, since banks would typically make provisions to cover against new non-performing loans.

The reliability of both of these accounting measures of credit risk will depend on accounting policies and accounting conventions, which might differ both across banks and across countries. Measures based on market prices avoid these difficulties and are therefore useful in particular in a cross-country set-up. A basic measure of risk that can be derived from market prices is the standard deviation of equity returns.

Banks with large underlying asset risk should be more affected by new information than banks with a relatively safe underlying portfolio. The responsiveness of equity prices to news is therefore a measure of the riskiness of the bank (Nier & Baumann, 2003). Also numerous empirical studies such as Laeven & Levine (2009), Agoraki et al. (2011) and Isshaq et al. (2012) used the Z-score index as a proxy for overall risk-taking of a bank. The Z-score which is define as the summation of return on asset and capital adequacy ratio divided by standard deviation of return on asset.

### **2.6.3 Justification for Using Z-Score**

Ghana has a peculiar case, in that most of the banks in Ghana are not listed on the stock exchange. This makes it impossible to compute the standard deviation of equity returns or equity price volatility for most of the banks since only few of them are listed on the stock exchange. In effect, risk measures that involve the standard deviation of equity returns or equity price volatility cannot be employed. Also, the researcher is interested in total risks; therefore using credit risk will not be appropriate. The Z-score is employed since its computation involves standard deviation of asset returns which the researcher can obtain for all the sample banks and also the Z-score is used to indicate total risk. This justifies the use of the Z-score as a proxy for risk for the study.

## **2.7 Review of Previous Studies**

### **2.7.1 Stress Testing**

The Working Group on Macro Stress Testing established by the committee on the global financial system, 2000 investigated the use of stress testing at large financial institutions, in line with the Committee's overall mandate to improve central banks' understanding of institutional developments relevant to global financial stability. Members of the group interviewed risk managers at more than twenty large, internationally active financial institutions, both in their home countries and as a group at a meeting hosted by the Banque de France. The interviews were based on "state of the art" in the design and implementation of stress tests and on the role of stress testing in risk management decisions at the corporate level.

Sorge (2004) critically reviewed the state-of-the-art of macro stress testing methodologies. His paper distinguished between two main methodological approaches to macro stress-testing. Namely, piecewise approach and integrated approach. The piecewise approach

evaluates the vulnerability of the financial sector to single risk factors, by forecasting several financial soundness indicators such as non-performing loans, capital ratios and exposure to exchange rate or interest rate risks under various macroeconomic stress scenarios.

The integrated approach combines the analysis of the sensitivity of the financial system to multiple risk factors into a single estimate of the probability distribution of aggregate losses that could materialise under any given stress scenario. His survey focused on macro stress-testing models. He indicated that, results of recent macro stress-tests have sometimes been criticised of depicting an either too rosy or too bleak picture of financial system vulnerabilities. According to him, a good part of the criticism is directed to the choice and calibration of the stress-scenarios. However, significant under- or overestimation of systemic risks can also be ascribed to the use of simplified methodologies often driven by data constraints. Sorge (2004) survey identified three important methodological challenges that would deserve further attention.

The first being non-additivity of risks and of risk measures. He indicated that, a correlated set of shocks to the pace of macroeconomic activity, interest rates or asset prices may be a source of both market and credit risk for financial institutions. In this sense, given their joint likelihood of occurrence, risks should not be analysed using separate models and then simply added up. A superior approach consists in integrating models of market and credit risks.

Similarly, since the potential losses faced by various financial institutions are also correlated, risk measures like value-at-risk, computed as vulnerability indicators of single portfolios or financial institutions, cannot be simply summed up to provide a picture of systemic risk. Instead, a macro portfolio approach is necessary to model the potential losses of the entire

financial system. The second is length of time horizon. Under this, he indicated that historical experience suggests that both the build-up and resolution of macro-financial imbalances may span several years. Therefore macro-economic shocks are likely to be serially correlated over time.

Also, systemic vulnerabilities arise from the progressive erosion of capital reserves as a result of financial strains that persist over multiple years. Therefore, measuring only the first-year impact of a given stress scenario may underestimate the full impact on the vulnerability of the financial system. Moreover, as the response time necessary for policy makers to deal with potential financial imbalances often exceeds one year, their “risk measurement horizon” should be lengthened accordingly. The third is feedback effects and endogenous parameter instability. That is, measuring the full impact of a set of macroeconomic shocks on the fragility of the financial system over a longer horizon requires relaxing the partial equilibrium (and in particular portfolio invariance) assumption usually adopted in the risk management practices of individual financial institutions.

He argued that when faced with an adverse macro scenario, all agents in the economy and in particular financial institutions will re-optimize their behaviour accordingly and their responses may or may not follow similar reaction functions as in the past. Risk-minimising responses, that are perfectly rational at the level of individual institutions have, however, the potential to ignite domino effects leading to more rather than less risk in the aggregate. In particular, endogenous portfolio adjustments may change the overall risk exposure of the financial system, following a given set of shocks, as well as the volatilities and correlation structures of asset prices or default probabilities.

Besides, endogenous portfolio reallocations in a stressed macro- scenario can also feedback on equilibrium market prices or macroeconomic activity due to hedging practices or a credit crunch. It is important therefore to account for feedback effects in macro stress-testing and apply estimation methods that allow volatilities and correlations to vary conditional on stress events. His findings indicated that, given the increasing incidence of financial crises around the world, paying closer attention to the vulnerabilities of the financial sector from a macro perspective, and enforcing adequate prudential policies, is crucial to prevent the severe costs of bursting financial bubbles. Furthermore, macro stress-testing may be useful to address monetary policy trade-offs, incorporating financial stability considerations into monetary policy decision-making. Again the reaction function of policy interest rates to macroeconomic developments is an integral part of macro stress-testing ( Sorge, 2004).

Amediku (2006) applied Vector Autoregressive (VAR) methodology to stress test the Ghanaian banking system. His paper estimated the changes in macroeconomic variables on the NPL ratio of the banking industry. The empirical findings agree with the theoretical assumptions underlying the investigated transmission and with the empirical findings presented in the VAR literature. His findings indicated that, impulse responses do not vary from similar studies on other countries.

Also, significant positive relationships have been established between the banking industry's NPL ratio and the CPI as well as the output gap. The most likely outlook for the quality of the banking sector's loan portfolio is that up to the end of 2007 the NPL ratio will follow a slightly downward trend below double-digit rates. The impulse response functions also suggest that the NPL ratio increases after eight quarters following unexpected output gap but

after nine quarters following unexpected increase in inflation. Unexpected increase in Prime rate leads to significant increase in NPL ratio with the maximum after six quarters.

The OSFI (2009) came out with guideline for stress testing. It was stated that, stress testing programs should take account of views from across the organisation and should cover a range of perspectives and techniques. The identification of relevant stress events, the application of sound modelling approaches and the appropriate use of stress testing results each require the collaboration of different senior experts such as risk controllers, economists, business managers, traders and actuaries. Institutions should also use a range of techniques in order to achieve comprehensive coverage in their stress testing program, including quantitative and qualitative techniques to support and complement models and to extend stress testing to areas where effective risk management requires greater use of judgement. Also, institutions should have written policies and procedures governing the stress testing program. The operation of the program should be appropriately documented.

Again, an institution should have a suitably robust infrastructure in place, which is sufficiently flexible to accommodate different and possibly changing stress tests at an appropriate level of granularity. Moreover, an institution should regularly maintain and update its stress testing framework. The effectiveness of the stress testing program, as well as the robustness of individual components, should be assessed regularly and independently (OSFI, 2009).

According to Blaauw (2009), banks have not been very successful in implementing effective stress testing systems in the past. The reasons for this are lack of data, complexity and quantitative models capability required and inability to integrate the results of stress testing

with the risk management decision process. He mentioned challenges in implementing stress testing. First and foremost challenge in implementing stress testing is the lack of historical data to measure the impact of extreme stress events. The second pre-requisite for a successful stress testing programme, is to have board level approved risk appetite limits. These limits will serve as bench marks, and based on the stress test results, indicate the necessary actions to be taken. He concluded that, without such limits, no action will be taken. However, Blaauw (2009) did not come out with strategies to achieve an ideal board level approved risk appetite limits.

Schuermann (2012), considered the framework for the stress testing of banks: why is it useful and why has it become such a popular tool for the regulatory community in the course of the recent financial crisis; how is stress testing done – design and execution; and finally, with stress testing results in hand, how should one handle their disclosure, and should it be different in crisis vs. “normal” times. His framework focused on capital. He stated that the problem of sizing the amount of capital needed to support the risk taking of a bank is not new; but the use of broad-based supervisory stress tests for an entire banking system is new and that the first use was in 2009 in the U.S.

According to Schuermann (2012), a critical component of the exercise is the disclosure of the results and the reason stress testing became an imperative was precisely because existing approaches that were publicly disclosed, such as regulatory capital ratios, were no longer informative and heavily (if not entirely) discounted by the market. Therefore to regain credibility, supervisory authorities needed to disclose enough to allow the market to “check the math.” But broad-based supervisory stress testing has not been universally successful, as the 2010 and 2011 European experience has shown. Also, it was not clear how useful such broad supervisory stress testing with concomitant disclosure will be as a matter of routine. In that, the stress testing was sprung on the banks at short notice, and thus very difficult to

manipulate through careful pre-positioning, and it was tailored to the situation at hand, genuinely revealing new information to all participants and the public. As a result, trust was regained. Once trust has been re-established, the cost-benefit of stress testing disclosures may tip away from bank-specific towards more aggregated information. This still provides the market with unique information (supervisors, after all, have access to proprietary bank data) without dis-incentivizing market participants from producing private information and trading on it – with all the downstream benefits of information-rich prices and market discipline, (Schuermann, 2012). The framework chosen by Schuermann (2012) is applicable to capital and liquidity adequacy, but he only focused on capital which does not consider stress testing wholly.

The Federal Reserve, the Office of the Comptroller of the Currency, and the Federal Deposit Insurance Corporation collectively issued a guidance to emphasize the importance of stress testing as an on-going risk management practice that supports banking organizations' forward-looking assessment of risks and better equips them to address a range of adverse outcomes. Building upon previously issued supervisory guidance that discusses the uses and merits of stress testing in specific areas of risk management, their guidance provides broad principles a banking organization should follow in conducting its stress testing activities, such as ensuring that those activities fit into the organization's overall risk management program. The guidance outlines broad principles for a satisfactory stress testing framework and describes the manner in which stress testing should be employed as an integral component of risk management that is applicable at various levels of aggregation within a banking organization, as well as for contributing to capital and liquidity planning. In their guidance they stated five (5) general principles that a banking organization should apply in implementing such a framework.

The first principle state that a banking organization's stress testing framework should include activities and exercises that are tailored to and sufficiently capture the banking organization's exposures, activities, and risks. Secondly, an effective stress testing framework employs multiple conceptually sound stress testing activities and approaches. Thirdly, an effective stress testing framework is forward-looking and flexible. Fourthly, stress test results should be clear, actionable, well supported, and inform decision making.

Finally, an organization's stress testing framework should include strong governance and effective internal controls. In their guidance they emphasised that, while stress testing can provide valuable information regarding potential future outcomes, similar to any other risk management tool it has limitations and cannot provide absolute certainty regarding the implications of assumed events and impacts and that no single stress test can accurately estimate the impact of all stressful events and circumstances. Therefore, a banking organization should understand and account for stress testing limitations and uncertainties, and use stress tests in combination with other risk management tools to make informed risk management and business decisions.

Unlike Schuermann (2012), who only considered capital stress testing, the Federal Reserve, the Office of the Comptroller of the Currency, and the Federal Deposit Insurance Corporation considered both capital and liquidity stress test. Their guidance did not provide detailed instructions for conducting stress testing for any particular risk or business area, but the document describes several types of stress testing activities and how they may be most appropriately used by banking organizations. Also the document stated the approaches of stress testing and not the modules of stress testing. Moreover, the guidance is applicable to

only institutions supervised by the agencies (Ware & Shek, 2012) with more than \$10 billion in total consolidated assets indicating that it is not generally applicable to all institutions.

Oura (2012) conducted a survey of stress testing practices among selected national central banks and supervisory authorities. The central banks and where relevant, supervisory authorities from, 23 jurisdictions participated in the survey. The survey focused on principles and practices of stress testing for banks. The result of the survey indicated that TD (top-down) tests are conducted relatively more frequently (semi-annual or annual) than BU (bottom-up) tests which is mostly annual. Again, credit risk is always incorporated in the tests, followed by market risk, interest risk in the banking book, and funding liquidity risk. Most of the respondents conduct macro scenario tests that involve simultaneous shocks in multiple risk factors. Many also carry out single-factor and multi-factor tests separately. The survey also indicated that, stress scenarios are formulated on the basis of historical data, as well as by utilizing expert judgment or externally-provided parameters. After the crisis, the ranking and definition of risk factors changed significantly more focused on liquidity and funding risks.

A number of authorities use both accounting (balance sheet) and market-based data while many primarily rely on accounting-based information, from published sources, supervisory data, or both. Liquidity tests focus primarily on individual bank liquidity conditions, but a number of authorities also examine disruptions in market funding and, to a lesser extent, systemic liquidity. The country's own experience is the most frequently used source in establishing liquidity stress scenarios and assumptions. Over 80 percent of the respondents communicate the solvency test results outside their institutions, but only 50 percent of the respondents do the same for the liquidity tests. Only a few of the respondents indicated that

they are required to communicate the test results to the general public. Nevertheless, many do so voluntarily.

Solvency results are mostly reported on annual or semi-annual basis, and the majority of the reported liquidity tests are on a semi-annual basis. The main objectives of communication are reported to be one, raising public awareness on financial stability, two, achieving transparency, and three, providing information to market participants. Overall, public communication seems to have provided positive experiences in terms of transparency and reinforcing confidence. However, several respondents voiced concerns, such as that public communication could create unrealistic expectations for stress tests; that mass media tend to interpret the results inconsistently; or that the communication process is too burdensome (as banks focus too much on communication aspects) and could undermine the effectiveness of stress tests as a supervisory tool.

### **2.7.2 Disclosure and Risk -Taking**

Disclosure theory indicates that corporate disclosures are complex constructions capable of a variety of interpretations (Papo, 2008).

Cordella & Yeyati (1998) examined the impact of public disclosure of information about banks' risk exposure on the probability of bank failures. Their findings indicated that when banks have complete control over the volatility of their loan portfolio, public disclosure reduces the probability of banking crises. However, when banks do not control their risk exposure, the presence of informed depositors may increase the probability of bank failures. This confirms the issue of market discipline as in disclosure theory.

Anderson & Fraser (2000) conducted a study on corporate control, bank risk taking, and the health of the banking industry. They found that managerial shareholdings are positively related to total and firm specific risk in the late 1980s when banking was relatively less

regulated and when the industry was under considerable financial stress. Their findings indicated that, however, following legislation in 1989 and 1991 designed to reduce risk-taking and also reflecting substantial improvements in bank franchise value, managerial shareholdings and total and firm specific risk became negatively related in the early 1990s. Contrary, systematic risk was unrelated to managerial ownership in both periods.

Healy & Palepu (2001) provided a framework for analysing managers' reporting and disclosure decisions in a capital markets setting, and identify key research questions. They reviewed research on financial reporting and voluntary disclosure of information by management, and summarized the key research findings. They concluded that the increased pace of entrepreneurship and economic change has probably increased the value of reliable information in capital markets. They also indicated that, the traditional financial reporting model appears to do a poor job of capturing the economic implications of many of these changes in a timely way. Hence, there is an opportunity for future disclosure research to examine how financial reporting and disclosures adapt to changes in business and capital market environments.

Blum (2002) conducted a study on subordinated debt, market discipline, and banks' risk taking. His findings indicated that, in comparison with full deposit insurance, subordinated debt reduces risk only if banks can credibly commit to a given level of risk. On the other hand if banks are not able to commit, subordinated debt leads to an increase in risk. He explained that this is so because, due to limited liability banks always have an incentive to increase their risk after the interest rate is contracted in order to reduce the expected costs of debt. Again, rational debt holders anticipate this behaviour and accordingly require a higher

risk premium *ex ante*. The higher interest rates in turn further aggravate the excessive risk-taking incentives of banks.

Nier & Baumann (2003) investigated the effectiveness of market discipline in limiting excessive risk-taking by banks. They constructed a large cross-country panel data set consisting of observations on 729 individual banks from 32 different countries over the years 1993 to 2000. They focused on existing theory which implies that the strength of market discipline ought to be related to the extent of the government safety net, the observability of bank risk choices and to the proportion of uninsured liabilities in the bank's balance sheet. They particularly analysed the effect of three sets of factors related to the strength of market discipline. Namely, the of explicit or implicit government guarantees (insurance), the amount of uninsured liabilities in the bank's balance sheet (funding) and the degree of observability of the bank's risk choices (disclosure).

Their capital regressions findings indicated that explicit or implicit government guarantees lead banks to choose lower capital buffers, *ceteris paribus*. They also found that a higher share of uninsured funding has a disciplining effect leading banks to choose larger capital buffers for given risk. Again their result showed evidence in favour of the idea that, those banks that disclose more information and thus are subject to stronger market discipline limit their probability of defaults by choosing a higher capital buffer. However, their result indicated that all of these effects are weaker when they look at the subsample of banks for which the market believes that government support will lead to a bail-out, effectively insuring investors. Also they found that interbank discipline is not effective for banks that are close to insolvency, but disclosure is effective for these banks.

Their risk regressions findings indicated that the effect of an extensive deposit insurance scheme on bank risk is somewhat mixed and this confirms what Blum (2002) found. Also, based on their risk regressions it is not clear that uninsured funding sources lead to lower

default risks of banks. They, however, found strong support for the hypothesis that banks disclosing more information - either in their published accounts or by having a second listing in the US – have lower realised risk. Furthermore, there are also differential effects of market discipline on risk for banks that are close to insolvency compared to banks with a lower default probability. In addition, their findings indicated that, disclosure is more effective in limiting realised risk for a given capital for banks with a high probability of default. They stated that, this implies that disclosure is of particular importance when banks approach insolvency since other measures of market discipline may be less effective.

Konishi & Yasuda (2004) examined empirically the determinants of risk taking at commercial banks in Japan. They found that the implementation of the capital adequacy requirement reduced risk taking at commercial banks. Their findings indicated that acceptance of retired government officials on banks' boards has an insignificant effect on bank risk. Also, the relationship between the stable shareholders' ownership and bank risk is nonlinear; the risk decreases initially with the ownership by stable shareholders, and then increases as the asset substitution effect dominates the effect of managerial entrenchment on bank risk. Again, their paper found that decline of franchise value increases bank risk.

Baumann & Nier (2004) investigated empirically the relationship between the volatility of a bank's stock price and the amount of information the bank discloses to the market. In particular, they investigated whether banks that disclose a lot of information might have lower stock volatility than banks that disclose little information. The evidence presented in their paper suggests that information disclosure may be useful to both investors and banks. They found that banks that disclose more information on key items of disclosure show lower measures of stock volatility than do banks that disclose less information.

Linsley & Shrives (2005) examined the issue of risk disclosure in the banking sector. Using the Basel Committee 2001, 2002 and 2003 papers as the most comprehensive bank disclosure analyses they indicated that banks are not yet attempting full risk disclosure. They recommended that there is a strong need for supervisory authorities to both fully explain the benefits that can accrue from greater risk disclosure and to provide empirical proof that these benefits do arise in practice. However, they indicated that perfection in risk disclosure is not achievable but if directors can be encouraged to think creatively then the Pillar 3 risk disclosures can be effectively enhanced by supplementary risk disclosures. They concluded that this in turn will strengthen corporate governance in the banking sector and better support the market's disciplining mechanism.

Boyd & Nicolo (2005) examined the theory of bank risk taking and competition. Their paper indicated that, there is a body of literature that concludes that, when confronted with increased competition banks rationally choose more risky portfolios. Having reviewed this literature, they show that a positive relationship between the number of bank competitors and risk seeking is fragile. They argued that the evidence is best described as "mixed" and conclude that, there exist fundamental risk-incentive mechanisms that operate in exactly the opposite direction, causing banks to become more risky as their markets become more concentrated.

Hirtle (2007) examined the relationship between the amount of information disclosed by bank holding companies (BHCs) and their subsequent risk profile and performance. They constructed an index of publicly disclosed information about the BHCs' forward-looking estimates of market risk exposure in their trading and market-making activities. Their paper then examined the relationship between this index and the subsequent risk and return in both the BHCs' trading activities and the firm overall, as proxied by equity market returns. Their

findings are that more disclosure is associated with lower risk, especially idiosyncratic risk, and in turn with higher risk-adjusted returns. They indicated that these findings suggest that greater disclosure is associated with more efficient risk taking and thus improved risk-return trade-offs, although the direction of causation is unclear.

Hossain (2008) conducted a study on the extent of disclosure in annual reports of banking companies in India. He conducted an empirical investigation of the extent of both mandatory and voluntary disclosure by listed banking companies in India. A total of 184 items were selected of which 101 and 81 were mandatory and voluntary respectively. The study revealed that in disclosing mandatory items, the average score is 88, whilst the average score for voluntary disclosure is 25. His findings also indicate that size, profitability, board composition, and market discipline variables are significant, and other variables such as age, complexity of business and asset-in-place are insignificant in explaining the level of disclosure. The results also indicate that Indian banks are very compliant with the rules regarding mandatory disclosure. In contrast, they are far behind in disclosing voluntary items.

Pérignon & Smith (2008) studied both the level of Value-at-Risk (VaR) disclosure and the accuracy of the disclosed VaR figures for a sample of US and international commercial banks. They developed a VaR disclosure index that captures many different facets of market risk disclosure. They found large differences in the level of disclosure between US commercial banks and an overall upward trend in the quantity of information released to the public. Their cross-sectional analysis of the largest banks in the world indicated that US disclosures are below average. They also found that Historical Simulation is by far the most popular VaR method. They found that VaR computed using Historical Simulation contains very little information about the future volatility of trading revenues and that a simple GARCH model often dominates bank proprietary VaR models. Also, they showed that this

finding is a natural consequence of the growing popularity of the Historical Simulation method among banks.

Leuz & Wysocki (2008) examined the theoretical and empirical literature on the economic consequences of financial reporting and disclosure regulation. They provided a framework that identifies firm-specific (micro-level) and market-wide (macro-level) costs and benefits of firms' reporting and disclosure activities and then used this framework to discuss potential costs and benefits of regulating these activities and to organize the key insights from the literature. Their survey illustrated a general paucity of evidence on market-wide and the aggregate economic and social consequences of reporting and disclosure regulation, rather than the consequences of individual firms' accounting and disclosure choices. Findings from their survey indicated that prior literature focused on managers' voluntary disclosure and financial reporting choices and that these studies provided few insights into the overall desirability, economic efficiency or aggregate outcomes of reporting and disclosure regulation. Also, researchers have not fully explored the outcomes and implications of these numerous and major regulatory and enforcement changes in other countries than U.S.A.

Wang et al. (2008) examined empirically the determinants of voluntary disclosure in the annual reports of Chinese listed firms that issue both domestic and foreign shares and determine if the cost of debt capital is related to the extent of voluntary disclosure. They found the level of voluntary disclosure is positively related to the proportion of state ownership, foreign ownership, firm performance measured by return on equity, and reputation of the engaged auditor. However, their findings indicated that there is no evidence that companies benefit from extensive voluntary disclosure by having a lower cost of debt capital.

Laeven & Levine (2009) conducted an empirical assessment of theories concerning risk taking by banks, their ownership structures, and national bank regulations. They focused on conflicts between bank managers and owners over risk, and they showed that bank risk taking varies positively with the comparative power of shareholders within the corporate governance structure of each bank. Also, they indicated that the relation between bank risk and capital regulations, deposit insurance policies, and restrictions on bank activities depends critically on each bank's ownership structure, such that the actual sign of the marginal effect of regulation on risk varies with ownership concentration. Their findings show that the same regulation has different effects on bank risk taking depending on the bank's corporate governance structure.

Rouf & Harun (2011) examined the association between ownership structure and voluntary disclosure levels in the 2007 annual report of 94 samples of Bangladeshi listed companies. Their result indicated that the extent of corporate voluntary disclosures is negatively associated with a higher management of ownership structure and the extent of corporate voluntary disclosures is positively associated with a higher institutional ownership structure.

Putu et al. (2012) empirically investigate whether voluntary disclosure affects earnings management at the banks which is listed in Indonesian Stock Exchange. Their result indicated that voluntary disclosure negatively effects earnings management. Their findings show that more increased voluntary disclosure influences more decreased earnings management. Therefore, voluntary disclosure is very important for users of financial statements.

Mallin & Ow-Young (2012) examined the relationship between company and ownership characteristics and the disclosure level of compliance with Quoted Companies Alliance

(QCA) recommendations on corporate governance in Alternative Investment Market (AIM) companies. They reported that compliance increases with company size, board size, the proportion of independent non-executive directors, the presence of turnover revenue, and being formerly listed on the Main Market. However, they found that shell and highly geared AIM companies disclose relatively lower levels of corporate governance than recommended under QCA guidelines. Also, they found no evidence that ownership structure or the type of Nominated Advisor is related to disclosure of compliance with QCA guidelines.

Bischof & Daske (2012) use the EU-wide stress-testing exercises and the concurrent Eurozone sovereign debt crisis as a setting to study consequences of supervisory disclosure of proprietary bank-specific information. They analysed how onetime supervisory disclosures interact with banks' subsequent voluntary disclosures and, thus, bank opaqueness. They also analysed whether stress-test disclosures may induce a change in banks' risk-taking behaviour, thus mitigating industry-wide risk exposure and uncertainty in financial markets. Their findings indicated a substantial and relative increase in stress-test participants' voluntary disclosure of sovereign credit risk exposures subsequent to the mandated release of credit risk related disclosures. From their result, such a commitment to increased disclosure is accompanied by a decline in bank opaqueness. Their findings further show that negative stress-test results are associated with a subsequent reduction in sovereign risk-taking. The result highlights that the efficacy of supervisory disclosure as a macro-prudential tool hinges on whether it indirectly contributes to a decrease in financial market uncertainty by providing disciplining incentives for banks to reduce their level of exposure.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

In the previous chapter, a comprehensive review of existing theory and literature on the topic under study was presented which guided the researcher on choice of research design for the study and the estimation techniques to be employed in analysing the data. Explaining the methodology for the study is the focus of this chapter. In this chapter, we will see how risk taking behaviour of banks in Ghana from 2007-2011 is captured in this study, how the relationship between disclosure and risk taking behaviour is established in the study and the assessment as to whether stress test induces banks risk taking behaviour are achieved or ascertained. This chapter discusses population and sampling, the model sources and description of the model, and variables used in the study.

#### **3.2 Data Sources**

The information used for this study was acquired mainly from secondary data. Primary data was obtained from Head Offices of banks where the information could not be accessed from secondary sources. This study made use of secondary data of mandatory and voluntary disclosure items from annual report of banks, International Financial Reporting Standard 7 (IFRS 7) financial instruments disclosure requirement and Bank of Ghana Statutory Audit Disclosure Requirement. Secondary data on the comparative analysis of bank's performance over the years (2007 – 2011) from the Ghana Association of Bankers (GAB) was also used to support this study. Also, primary data on Bank of Ghana stress testing exercise and individual bank's internal stress testing exercise were obtained from Bank of Ghana and Head Offices of the sample banks. The data collected is in both qualitative and quantitative forms.

Bank-level panel databases (balanced) of the needed variables were constructed from the annual report of individual banks. Only banks that have been in operation from 2007- 2011 in Ghana were selected, hence balanced panel database.

### **3.3 Population and Sampling**

The population for this study is the banking industry in Ghana. Currently there are 28 banks in Ghana. This study is interested in banks that have been in continuous operation from 2007-2011. Therefore the purposive sampling technique was employed to get the sample. That is for a bank to qualify to be included in the sample, that bank should have been in operation from the year 2007 – 2011. This is to eliminate missing data issues. The sample size is therefore made up of 20 banks in Ghana.

### **3.4 Risk -Taking Behaviour by Ghanaian Banks**

One objective of this study is to find the general risk-taking behaviour by banks in Ghana for the period 2007- 2011. The ratio of provisions for loan losses to gross loans by each bank for each year was used as a measure of its level of exposure to risk for the purpose of this objective. This is due to the fact that the main risk exposure of Ghanaian banks is the credit risk exposure, according to the findings of Bank of Ghana stress test exercise. The risk level from year to year was analysed to get the trend of risk-taking by Ghanaian banks.

### **3.5 Relationship Between Disclosure And Risk- Taking Of Banks**

Review of existing literature on disclosure and risk taking indicated that a number of studies have shown a positive relationship between disclosure and risk taking behaviour of banks. Some of the studies demonstrate how market risk disclosure affect subsequent equity price volatility (Hirtle, 2007), how mandatory stress test disclosure affect equity bid- ask spread of banks (Bischof and Daske, 2012). Others show how stock price volatility relates to capital buffers and the amount of information disclosed (Nier and Baumann, 2003).

The primary purpose of this study is to investigate the impact of disclosure on risk taking behaviour of banks in Ghana. This was achieved by developing a similar framework used by Nier & Baumann (2003) and subsequent work of Hirtle (2007). The study was also extended by determining the risk taking behaviour of banks in Ghana and the impact of stress test exercise on risk taking of banks in Ghana.

### **3.5.1 Panel Model**

Panel data methodology assumes that individuals, firms, countries or states are heterogeneous. Again, panel data derived from a given sample of observations on individuals, firms, states or countries over a period of time. Panel data analysis involves a class of linear econometric models that commonly arise when time series and cross-sectional data are combined. Panel gives several advantages over the usual cross-sectional or time series data sets. The analysis helps to resolve the difficulty of making inferences about the dynamics of change from a cross-sectional perspective. Also, it provide a means to minimize the effects of omitting variables that are correlated with explanatory variables in empirical studies and allows one to control for individual heterogeneity (Hsiao, 2003).

### **3.5.2 Panel Model Assumption**

Panel model is characterised by some assumptions and this study has considered some of these assumptions which are relevant to the data. The panel assumptions considered in this study are homoscedasticity and no autocorrelation.

### **3.5.3 Heteroscedasticity and Autocorrelation**

The problems of heteroscedasticity (which is usually associated with cross-sectional data) and autocorrelation (which is usually associated with a time series data) are sometimes observed even in panel datasets. Heteroscedasticity has been defined to exist when the variance of the error of a model is not constant across both time and space while

autocorrelation refers to a situation in which the correlation between error terms belonging to different periods is not zero. In this study, the modified Wald test for group-wise heteroscedasticity in fixed effects regression and the Wooldridge test or the Lagrange-Multiplier test for autocorrelation model is employed to test for heteroscedasticity and autocorrelation respectively.

### 3.5.4 The Hausman Specification Test

The Hausman specification test was applied to determine whether fixed effect or random effect is applicable to the data for the study. Based on the outcome of hausman specification test the random-effects GLS regression was applied to estimate the model defined below.

Panel data methodology has been employed to determine the effects of disclosure on risk taking behaviour of banks in Ghana. The regression model used by Hirtle (2007) was adopted to ascertain the relationship between risk taking and disclosure. The model in it reduced form is stated as follows:

$$Y_{it} = \beta_1 Disclosure_{i,t-1} + \beta_2 X_{it} + \varepsilon_{it}$$

where  $Y_{it}$  is the risk measure,  $Disclosure_{i,t-1}$  is the index of disclosure, and  $X_{it}$  is the vector of control variables and  $\varepsilon_{it}$  is the error term.

The model in comprehensive form is as follows:

$$Y_{it} = \beta_1 Disclosure_{i,t-1} + \beta_2 BKS_{it} + \beta_3 Pf_{it} + \beta_4 LR_{it} + \beta_5 TBR_{it} + \varepsilon_{it}$$

where:  $Y_{it}$  = Risk measure, Disclosure = Disclosure index, Bks = Bank size, Pf = Profitability, LR = Liquidity Ratio, TBR = Treasury Bill Rate,  $\varepsilon_{it}$  = Error Term

### **3.6 Variables**

This study undertakes the issue of identifying key variables that influences risk taking of banks in Ghana. The selection of the variables is influenced by previous studies on disclosure and risk taking. However, one new variable was introduced, which is Treasury Bill Rate. The variables used to test the relationship between disclosure and risk -taking are stated below. They include dependent variable, independent variable and some control variables.

### **3.7 Dependent Variable**

Risk taking is the dependent variable. The measure of risk used in previous studies varied. Some studies used bid-asked spreads or price volatility as a proxies for risk, example Luez & Verrecchia (2001), Baumann & Nier (2004), Hirtle (2007), Bischof & Daske (2012). Anderson & Fraser (2000), Konishi & Yasuda (2004) used the standard deviation of the bank's daily returns as a measure of total risk. Some also used the Z-score developed by Boyd et al. (1993) as a measure of risk taking. Example of researchers who have used Z-score as a measure of risk are Konishi and Yasuda (2004), Laeven and Levine (2009), Isshaq et al. (2012).

To analyse the effect of disclosure on risk taking, the Z-score which has been employed by several studies such as Konishi & Yasuda (2004), Laeven & Levine (2009), Isshaq et al. (2012) was used as a proxy for total risk- taking. The Z-score has been used as a proxy for risk in the sense that greater percentage of the sample banks are not listed on the stock exchange hence it is not possible to obtain their price volatility. This implies that, the measure of risk involving price volatility cannot be employed for the study hence the use of Z-score which uses the volatility of the bank's return on assets. Z-score equals the return on assets plus the capital asset ratio divided by the standard deviation of asset returns. The Z-score measures the distance from insolvency and thus indicating the probability of bankruptcy. A higher Z-score indicates that the bank is less risky (more stable). That is a

higher Z-score indicates less risk while a lower Z-score indicate more risk. The Z-score is measured as follows:

$$Z\text{-score} = \frac{ROA + CAR}{\sigma_{ROA}}$$

where ROA is the return on asset computed as the ratio of income after tax to total asset. That is

$$ROA = \frac{\text{Income after tax}}{\text{Total Asset}}$$

and

CAR (capital adequacy ratio) is the equity capital to total assets computed as;

$$CAR = \frac{\text{Equity Capital}}{\text{Total Asset}}$$

$\sigma_{ROA}$  indicates standard deviation of ROA.

Though the period under consideration is 2007-2011, the researcher obtained data for 2005 and 2006 in order to ascertain the ROA for 2005 and 2006. The  $\sigma_{ROA}$  (standard deviation of ROA) for each year was computed by using ROA figures from the immediate two years before the particular year under consideration and that particular year's ROA. For instance, the standard deviation of ROA ( $\sigma_{ROA}$ ) for 2007 was obtained by using ROA for 2005, 2006 and 2007. That of 2008 was ascertained using ROA figures for 2006, 2007 and 2008 and continued in this order for all the years under consideration. That is, a three year rolling calculation approach was used to compute for  $\sigma_{ROA}$  (standard deviation of ROA). The appropriateness of the Z-score measure used is therefore justified by the appropriate years used in computing  $\sigma_{ROA}$  for each year. The Z-score for each year was therefore obtained by adding ROA and CAR computed for that year and dividing the result obtained by the

standard deviation of ROA ( $\sigma_{ROA}$ ) computed for that year under consideration. For instance 2007 Z-score is computed as follows:

$$Z\text{-score (2007)} = \frac{ROA(2007) + CAR(2007)}{\sigma_{ROA}(2007)}$$

### 3.8 Independent Variable

There is this idea that a bank that discloses its risk profile exposes itself to market discipline and will therefore be penalised by investors for choosing higher risk. However, if investors do not know the risk profile of the banks, this discipline effect will not be achieved or will be weaker if the amount of information available to investors is limited. In theory, greater disclosure leads to efficient (reduced) risk-taking. Its therefore implies that disclosure is important for effective market discipline hence effective risk-taking. One may therefore ask whether greater disclosure always leads to efficient risk-taking. It is in line with this, that this work seeks to examine the influence of disclosure on risk-taking of banks in Ghana.

The independent variable employed in this study is the disclosure of information by banks. This is captured by constructing a disclosure index of 53 disclosure items, consisting of 30 mandatory disclosure items and 23 voluntary disclosure items. The mandatory disclosure items are derived from Bank of Ghana statutory disclosure requirement and the International Financial Reporting Standard 7 (IFRS 7) disclosure requirement. The voluntary disclosure items are taken from Hossian (2008) disclosure index. The annual report of the banks was studied to indicate whether they contain the variables in the disclosure index. The disclosure items are measured as a dummy variable in the index taking a value of 1 if the particular item is disclosed by the bank and zero if otherwise. These were aggregated to form a composite disclosure index as used in previous studies like Nier & Baumann (2003), and Hossian (2008). The total disclosure (TD) score of a bank is captured by composite disclosure index which is defined as;

$$TD = \sum_{i=1}^n d_i$$

where  $d_i = 1$  if the item is disclosed,  $d_i = 0$  if the item is not disclosed,  $n =$  number of items

The total of mandatory score for each bank for each year is multiplied by 30 because total mandatory items are 30, and that of voluntary disclosure is multiplied by 23 because total voluntary items are 23. The mandatory score is added to the voluntary score and divided by 53, for each bank and per each year. Therefore, the maximum disclosure value attainable per each year for each bank is 26.96 approximately 27.

### **3.9 Control Variables**

The control variables employed in this study are bank size, profitability, liquidity ratio, and treasury bill rate.

#### **3.9.1 Bank Size**

Bank size may play an important role in determining risk levels at banks because larger banks have more capacity to diversify risk, than small banks. Also, larger banks have greater access to capital markets and thus more flexibility to adjust to unexpected liquidity and capital shortfalls. One might expect larger banks to have lower risk levels than smaller banks if their portfolios are merely larger replications of those at small banks. In theory, since large banks are sufficiently capitalized and more diversified, risks are expected to decline as size increases (Bashir, 1999). Demsetz & Strahan (1997) reported that large bank holding companies offset the potential benefits of diversification through adopting more risky loan portfolios and operating with more leverage as. The natural log of total assets is used as a

measure of bank size. This has been employed in previous studies such as Konishi & Yasuda (2004), Hirtle (2007), Laeven & Levine (2009). That is

$$\text{Bank size} = \log (\text{Total Asset})$$

### 3.9.2 Profitability

There is this idea that banks with more profit take more risk. Theoretically, there exist trade-offs between returns and risks (Bashir, 1999). Thus, to earn adequate returns, a bank must take more risks. In view of that some empirical work had employed profitability in considering risk-taking. Profitability measured as return on asset (ROA) and is defined as;

$$\text{Profitability} = \frac{\text{Income after tax}}{\text{Total Asset}}$$

### 3.9.3 Liquidity Ratio

Theory of liquidity and bank risk-taking indicates that excessive liquidity induces risk-taking behaviour on the part of bank managers (Acharya & Naqvi, 2012). Bank with high liquidity ratio has the tendency to undertake more risk. Intuitively, one expects a bank with low liquidity ratio to have low risk. This is due to the fact that the more liquid a bank is the higher the tendency of that bank undertaking risky ventures. As employed by Laeven & Levine (2009), this study also control for liquidity ratio. Liquidity ratio is the ratio of bank's liquid assets to liquid liabilities. Liquid asset is computed by summing all assets other than fixed asset. Liquid liability is computed by summing all liabilities other than long term borrowings. That is

$$\text{Liquid Assets} = \text{cash and short term funds} + \text{investment} + \text{advances} + \text{other asset}$$

and

$$\text{Liquid Liabilities} = \text{deposit and current accounts} + \text{creditors and accruals} + \text{borrowings}$$

so that

$$\text{Liquidity Ratio} = \frac{\text{Liquid assets}}{\text{Liquid liabilities}}$$

### 3.9.4 Treasury Bill Rate

Bank of Ghana stress test exercise indicated that the main risk exposures of the banks are credit risk exposure. This follows that a bank can reduce its risk exposure by reducing its credit exposure. Intuitively, it is logical for one to expect banks to invest more in treasury bill and give out less loans and advances to customer who may default if interest on treasury bill is high. Treasury bill rate is measured by quoting the Bank of Ghana 91 days treasury bill rate for each year.

### 3.10 Table 3.1 Variables And Predicted Relationship With Z-Score

Variable	Predicted sign
Disclosure index	+
Bank size	+
Profitability	-
Liquidity ratio	-
Treasury bill rate	+

There is an idea that greater disclosure leads to reduced risk taking because of market discipline. A higher Z-score indicate less risk. It therefore implies that as disclosure increases the Z-score also increases hence a positive sign is predicted.

In theory, since large banks are sufficiently capitalized and more diversified, risks are expected to decline as size increases (Bashir, 1999). Therefore it is expected that as bank size increases risk will also reduce (increase in Z-score) hence a positive sign is predicted.

There is this idea that banks with more profit take more risk. Theoretically, there exist trade-offs between returns and risks (Bashir, 1999). A negative sign is predicted for profitability because a lower Z-score means a higher risk. Theory of liquidity and bank risk-taking indicates that excessive liquidity induces risk-taking behaviour on the part of bank managers (Acharya & Naqvi, 2012). Bank with high liquidity ratio has the tendency to undertake more risk. Therefore, as liquidity ratio increases, Z-score is expected to reduce hence a negative sign is predicted.

The main risk exposures of the banks are credit risk exposures. This follows that a bank can reduce its risk exposure by reducing its credit exposure. It is logical for one to expect banks to invest more in treasury bill if interest on treasury bill is high than giving it out as loans and advances to customer who may default easily. Therefore as treasury bill rate increases Z-score is expected to increase hence positive sign is predicted.

### **3.11 Relationship Between Stress-Test Results and Subsequent Risk Taking Behaviour of Banks in Ghana**

The third objective of this study is to find out whether the banks in Ghana consider the stress test results released to them by Bank of Ghana in their risk management policy. That is, to determine whether stress test result induces subsequent risk taking by Ghanaian banks. This was to be achieved by finding a change in risk-taking which was to be measured by

calculating the difference between the sovereign risk exposures to sample banks as of December 31, 2007 as disclosed in the Bank of Ghana stress test exercise, and the exposures as of December 31, 2011 through cross-sectional OLS regression. However, due to lack of data concerning stress test results, primary data was acquired by employing close ended questionnaires. Information concerning how stress test exercise is done in Ghana was ascertained from Bank of Ghana. Questionnaires were administered to individual banks to confirm the information provided by Bank of Ghana. Questions were posted to enable the researcher ascertain whether the banks are aware of the stress test exercise conducted by Bank of Ghana, how many times the exercise is conducted in a year, how long it takes for the banks to get the results from bank of Ghana, whether the banks undertake any form of internal stress tests, whether the banks consider the outcome of the stress test results from Bank of Ghana in their subsequent risk management policies.

### **3.12 Limitations of the Methodology**

The researcher could not obtain Bank of Ghana's stress test results for the sample banks, because Bank of Ghana considers it as confidential information which cannot be released even to a researcher. This therefore compelled the researcher to use closed ended questionnaire to obtain primary data on stress testing.

Also the questionnaires were distributed to all the twenty sample banks but only sixteen of the banks responded to the researcher.

However, the results of the study are not affected by these limitations in that the model adopted does not include stress test because the researcher dropped the model containing stress test result and chose the model that fit the situation on the field. Besides the next

appropriate method was used to obtain some information on stress test which the model with stress test would have brought to bear. Also greater percentage of the sample banks responded to the information needed and the gap between the various responds are very wide. Therefore, the few who could not respond will not have any significant effect on the result.

## CHAPTER FOUR

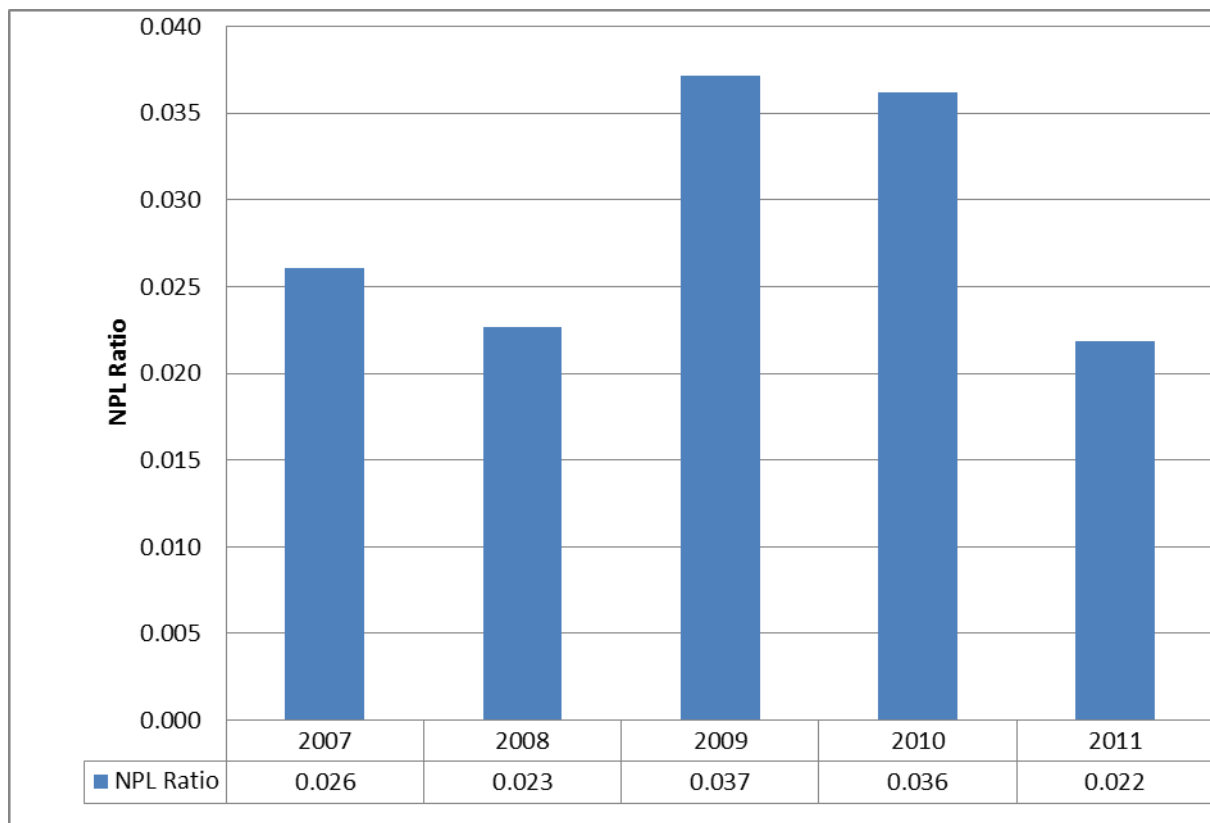
### DATA PRESENTATION AND ANALYSIS

#### 4.1 Introduction

The bar graph in figure 4.1 presents the risk-taking behaviour of the sample banks in Ghana for the period 2007 to 2011. Table 4.1, Table 4.2 and Table 4.6 present the descriptive statistics, correlation analysis, and the regression model result respectively.

#### 4.2 Risk –Taking Behaviour Of Banks In Ghana

**Figure 4.1**



Source: Author's Own Calculations Based On Annual Reports Of Banks From 2007-2011

The bar graph in figure 4.1 above represents the risk-taking behaviour of banks in Ghana for the period 2007 to 2011. As indicated earlier on, the ratio of non-performing loans to total loans was used as a measure of risk for this objective. Reading from the graph in figure 4.1, there was a decrease in risk exposure of the banks from 2007 to 2008. This is what stakeholders expect from the banks to be reducing their risk exposures. However, from 2008 to 2009 there was a vast increase in risk exposure of the banks. The main cause of this increase is due to the election cycle.

That is, in Ghana, the year after election and the immediate subsequent year are characterised by an increase in non-performing loan. This is so because government borrows more money internally and increase its expenditure in order to get more votes. After the election, the government then realises it has no money in the coffers to pay for the loans borrowed hence resulting in a vast increase in non-performing loans. It is therefore not surprising that from 2008 to 2009 there was a vast increase because 2009 is a year following an election year. Moving from 2009 to 2010 there was a slight decrease showing partial recovery from the election cycle impact. From 2010 to 2011 there was a vast decrease indicating that the banks had recovered from post-election crises and are now doing better. One may therefore ask whether indeed greater disclosure will always lead to reduced risk based on the election cycle effect in Ghana. Let find out from the discussion below.

### **4.3 Disclosure and Risk-Taking Of Banks In Ghana**

#### **4.3.1 Descriptive Statistics**

Table 4.1 provides descriptive statistics of the collected variables. Descriptive analysis shows the mean, and the standard deviation of the different variables used in the study. It also presents the minimum and the maximum values of the variables, which help in identifying

the maximum and the minimum value that each variable attained. That is, it presents descriptive statistic for 20 banks in Ghana for a period of five years, from 2007 to 2011 and for a total of 100 bank-year observations.

The mean value of Z-score (risk-taking) is 4385.74% and the standard deviation is 9179.52%. It means that value of Z-score can deviate from mean to both sides by 9179.52 %. The maximum value for the Z-score is 84036.49% while the minimum is 21.60%. The average disclosure score is 1991.85% with standard deviation of 261.46%, while the minimum and maximum scores are 1130.19% and 2426.42% respectively. Also the average value for bank size is 866.10% with a standard deviation of 37.75%. The minimum bank size is 761.51% and the maximum is 939%. On the average, profitability is 1.87% with a standard deviation of 2.22%. The minimum and maximum profitability are -7.47% and 9.55% respectively. Treasury bill mean is 16.32% with a standard deviation of 6.51%. 10.30% and 24.70% are the minimum and maximum treasury bill respectively. Also the average liquidity ratio is 661.20% and the standard deviation is 128.01%. The minimum liquidity ratio is 25.51% while the maximum is 1092.81%.

**Table 4.1 Descriptive Statistics Of The Variables**

	<b>Z-score</b>	<b>Disclosure</b>	<b>Bank size</b>	<b>Profitability</b>	<b>T. Bill</b>	<b>Lq. Ratio</b>
Mean	43.85738	19.91849	8.660521	.018687	0.1632	6.611972
Min	.2159527	11.30189	7.615089	-.0746634	0.1030	.2550539
Max	840.3649	24.26415	9.389975	.0955248	0.2470	10.9281
Std. Dev	91.79518	2.614625	.3774924	0.0222	0.0651	1.280134
N	100	100	100	100	100	100

Note: T. Bill = Treasury Bill, Lq. Ratio = Liquidity ratio, Std. Dev = Standard Deviation

Source: Author's Own Calculations Based On Annual Reports Of Banks From 2007-2011

### 4.3.2 Correlation Analysis

To determine the possible degree of multi-collinearity among the regressors, correlation matrixes of the variables are presented in Table 4.2. The figures in parenthesis are the p-

values for the correlations. The Z-score which is the dependent variable has positive relationship with treasury bill and profitability but has negative relationship with disclosure, bank size and liquidity ratio. Disclosure has positive relationship with bank size, profitability, and treasury bill but negative relationship with liquidity ratio. Bank size has a positive relationship with profitability but negative relationship with treasury bill and liquidity ratio.

Also profitability has negative relationship with treasury bill but positive relationship with liquidity ratio. Treasury bill has a positive relationship with liquidity ratio. Multi-collinearity is therefore not a problem in that only bank size has statistically significant relationship with disclosure and profitability as depicted by the p-values. To resolve this, each control variable was dropped at a time and hence five different regressions were run.

**Table 4.2 Correlations For The Variables**

	Z-score	Disclosure	Bank size	Profitability	T. Bill	Lq. Ratio
Z-score	1					
Disclosure	-0.0987 (0.3288)	1				
Bank size	-0.1257 (0.2129)	0.3007 <sup>***</sup> (0.0024)	1			
Profitability	0.0431 (0.6705)	0.0503 (0.6191)	0.2838 <sup>***</sup> (0.0042)	1		
T. Bill	0.1162 (0.2497)	0.1408 (0.1624)	-0.0607 (0.5484)	-0.1345 (0.1820)	1	
Lq. Ratio	-0.0449 (0.6576)	-0.0191 (0.8503)	-0.0005 (0.9958)	0.0600 (0.5529)	0.1287 (0.2019)	1

The symbol <sup>\*\*\*</sup> indicate statistical significance at 1% level.

Source: Author's Own Calculations Based On Annual Reports Of Banks From 2007-2011

### 4.3.1 Model Diagnostics

**Table 4.3 Hausman Specification Test Result**

Hausman chi2(5)	5.82
Prob>chi2	0.3242

The Hausman specification test indicates that the fixed effect is not significant hence the null hypothesis that fixed effect is preferred is rejected. Once the fixed effect is rejected the random effect is applicable hence the use of random effect.

**Table 4.4 Modified Wald Test For Group-Wise Heteroskedasticity In Fixed Effect Regression Model**

<b>Ho: <math>\sigma_i^2 = \sigma^2 \forall i</math></b>
<b>chi2 (20) = 5.0e+05</b>
<b>Prob.&gt;chi2 = 0.0000</b>

From table 4.4 the null hypothesis of homoscedasticity is rejected at 1%. As a result, heteroscedasticity is found to be present in the model but as argued by Issa & Quattara (2005), the presence of heteroscedasticity is easily adjusted for by fixed effect and random effect as well. The implication is that, the estimations would produce efficient and consistent estimates even in the presence of heteroscedasticity.

**Table 4.5 Wooldridge Test For Autocorrelation In Panel Data**

<b>Ho: no first-order autocorrelation</b>
<b>F( 1, 19) = 0.402</b>
<b>Prob. &gt; F = 0.5338</b>

From table 4.5 the null hypothesis of no first-order autocorrelation is not rejected at 10%. As a result, no first-order autocorrelation is found to be present in the model.

#### **4.4 Regression Results**

The regression result for the sample is presented in Table 4.4. The results show that disclosure of information has a statistically significant negative relationship with Z-score. That is, as disclosure increases Z-score decreases and as disclosure decreases Z-score increases. However, a higher Z-score indicates less risk while a lower Z-score indicate more

risk. This implies that, as banks disclose more information they turn to be more risky and as less information is disclosed the banks turn to be less risky. For result (1), Z-score was obtained from running the regression with all the control variables. For result (2), Z-score was obtained by running the regression without bank size. Also, for result (3), Z-score is the regression result without profitability. Likewise result (4), Z-score is the regression result without liquidity ratio and that of (5), Z-score is the regression result without treasury bill rate.

**Table 4.6 Regression Model Results**

	(1)	(2)	(3)	(4)	(5)
	Z-score	Z-score	Z-score	Z-score	Z-score
Disclosure index	-0.186 <sup>**</sup> (0.045)	-0.161 <sup>*</sup> (0.084)	-0.157 <sup>*</sup> (0.098)	-0.185 <sup>*</sup> (0.060)	-0.156 (0.109)
Bank size	-0.211 (0.717)		0.718 (0.270)	0.191 (0.769)	1.004 <sup>*</sup> (0.069)
Profitability	15.996 <sup>**</sup> (0.012)	9.849 <sup>*</sup> (0.070)		10.93 <sup>*</sup> (0.078)	6.383 (0.268)
Liquidity ratio	-0.002 <sup>*</sup> (0.094)	-0.294 <sup>***</sup> (0.003)	-0.287 <sup>***</sup> (0.003)		-0.316 <sup>***</sup> (0.002)
Treasury Bill	6.733 <sup>***</sup> (0.002)	4.999 <sup>***</sup> (0.004)	3.533 <sup>*</sup> (0.070)	5.642 <sup>**</sup> (0.010)	
_cons	7.090 (0.157)	5.518 <sup>***</sup> (0.004)	-0.241 (0.966)	3.866 (0.491)	-2.073 (0.679)
R-squared	0.3061	0.2622	0.1367	0.2035	0.1376
Adjusted R-squared	0.2556	0.2227	0.0905	0.1608	0.0914
Wald chi2(5)	19.94	27.35	26.88	15.97	20.30
Prob > chi2	0.0013	0.0000	0.0000	0.0031	0.0004
N	60	60	60	60	60

The symbols <sup>\*\*\*</sup>, <sup>\*\*</sup>, and <sup>\*</sup> indicate statistical significance at 1%, 5%, and 10% levels respectively.

Source: Author's Own Calculations Based On Annual Reports Of Banks From 2007-2011

It is expected that greater disclosure will be associated with more efficient risk taking as indicated by theory of disclosure and risk-taking. However, the result of this study indicates that greater disclosure does not always leads to less or efficient risk taking. From the result disclosure is significantly negatively related to Z-score which is a measure of risk-taking. The result indicates that greater disclosure is associated with more risk-taking and less disclosure is associated with less risk-taking, since a higher Z-score means less risk and a lower Z-score means more risk. Meaning as disclosure increases risk taking also increases hence making the banks more risky. That is, the higher the disclosure the higher the risk-taking (less sound) of the banks.

Therefore, there is positive relationship between disclosure and risk-taking. This is consistent with what Cordella & Yeyati (1998) indicated that when banks do not control their risk exposure, the presence of informed depositors may increase the probability of bank failures (more risky) which confirms the issue of market discipline as in disclosure theory.

This could be attributed to the fact that those banks that disclose more information are subject to market discipline but refuse to limit or control their subsequent risk taking hence leading to more risky state. The reason may be that market discipline is not very effective in the Ghanaian context to compel banks to limit their risk-taking. From the results, though disclosure is significant it is significant at five percent (5%) as shown by regression result 1 and this confirms that market discipline is not enhanced (ineffective) in Ghana. This may be due to investors and stakeholders' inability to comprehend the financial information or to seek financial analyst to interpret the information so as to make an informed decision.

Furthermore, it is logical for one to attribute the positive relationship between disclosure and risk-taking to the effect of election cycle in Ghana. The justification for this is that, the year

following election year is characterised by higher risk-taking by the banks as depicted by the bar graph in figure 4.1 which shows risk-taking behaviour of banks for the period under study. That is, while disclosure index for the period under study showed an increasing pattern, risk-taking (Z-score) showed both increasing and decreasing pattern with the gap of increasing pattern outweighing that of the decreasing pattern hence positive relationship between disclosure and risk-taking.

Therefore, one may confidently say that in Ghana, the immediate years after the election year are associated with higher risk-taking and therefore whether disclosure decreases or increases risk-taking for these years will be high hence market discipline being ineffective. This does not support the theory that greater disclosure leads to efficient risk-taking (lower risk-taking). Also the positive relationship between disclosure and risk-taking can be interpreted to mean that banks are giving more information just to signal to shareholders that they are working in their interest in order to reduce the effect of market discipline.

The results of this study revealed bank size is not important in influencing risk-taking behaviour of banks in Ghana.

The study found significantly positive relationship between profitability and Z-score. Indicating that, profitability has significant influence on risk – taking of banks in Ghana. This implies that, more profitable banks are less risky and less profitable banks are more risky.

Treasury bill rate was found to have statistically significant positive relationship with the Z-score, implying that treasury bill has significant influence on risk-taking of banks in Ghana. That is, as treasury bill rate increases banks risk-taking reduces, making the banks less risky. This is so because banks would invest in treasury bill if the rate is high than to lend to customers who may default and by so doing reducing their risk exposure hence less risky.

The study found significantly negative relationship between liquidity and the Z-score. This means as bank's liquidity increases the bank turns to be more risky. This could be attributed to the fact that more liquid banks are in the position to take up more profitable but riskier opportunities and avenues as they come, which in effect make them more riskier. Therefore less liquid banks are less risky and banks that are more liquid are more risky.

The Z-score has also been defined as a measure of solvency and therefore the result could be interpreted in relation with solvency. From the result disclosure is significantly negatively related to Z-score which measures the distance from insolvency and thus indicating the probability of bankruptcy. The result indicates that greater disclosure is associated with insolvency and less disclosure is associated with more solvencies. That is, the higher the disclosure the fewer solvencies or stable the banks are.

This is consistent with what Cordella & Yeyati (1998) indicated; that when banks do not control their risk exposure, the presence of informed depositors may increase the probability of bank failures which confirm the issue of market discipline as in disclosure theory. This means those banks that disclose more information are subject to market discipline but refuse to limit or control their subsequent risk taking hence leading to insolvency. This could be attributed to the fact that market discipline is not effective in the Ghanaian context to compel banks to limit their risk-taking.

From the results, though disclosure is significant it is significant at five percent (5%) for only regression 1 but ten percent (10%) for that of regression 2, 3, and 4. This confirms that market discipline is not effective in Ghana. This may be due to investors and stakeholders' inability to comprehend the financial information or to seek financial analyst to interpret the information so as to make an informed decision.

Furthermore, it is logical for one to attribute the negative relationship between disclosure and Z-score to the effect of election cycle in Ghana. The justification for this is that the year after election year is characterised by decreased Z-score hence insolvent. That is, while disclosure for the period under study showed an increasing pattern, Z-score showed both increasing and decreasing pattern with the gap of decreasing pattern outweighing that of the increasing pattern hence negative relationship between Z-score (solvency) and disclosure.

Also it can be deduced that banks are giving more information just to signal to shareholders that they are working in their interest in order to reduce the effect of market discipline.

The result of this study revealed statistically insignificantly relationship between bank size and the Z-score (solvency), indicating that, bank size is not relevant in influencing bank solvency in Ghana.

The study found significantly positive relationship between profitability and Z-score. Indicating that, profitability has significant influence on solvency of banks in Ghana, meaning that, more profitable banks are more solvents.

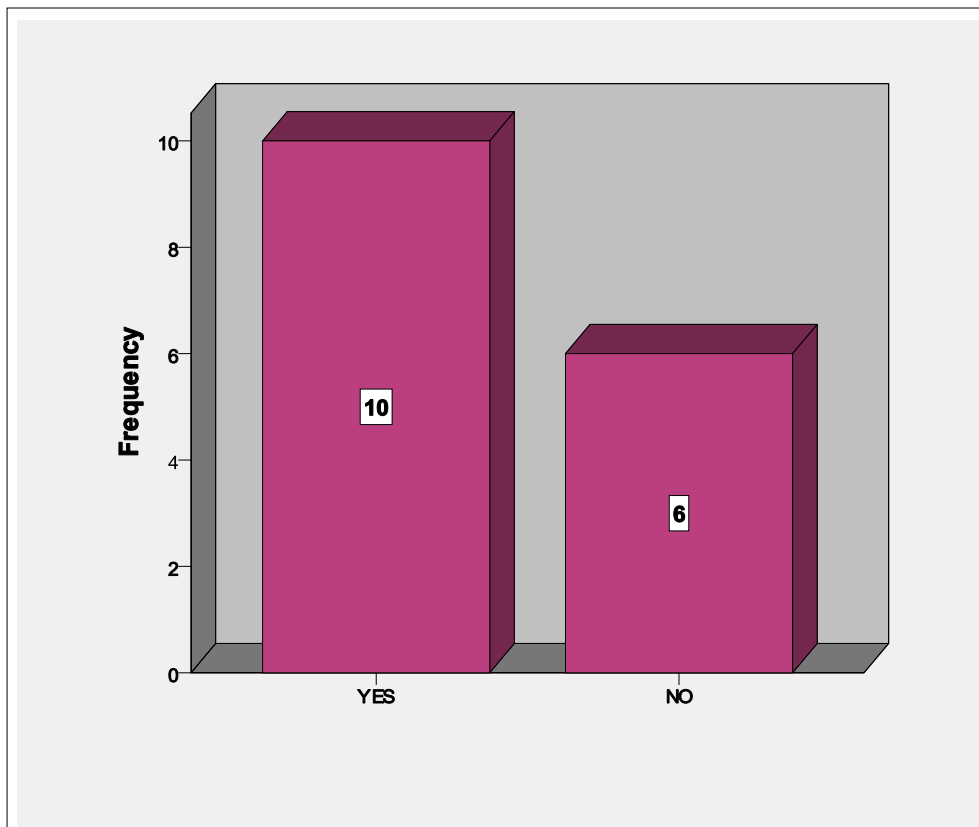
Treasury bill was found to have statistically significant positive relationship with the Z-score. That is, as treasury bill rate increases banks solvencies also increases. This is so because banks would invest in treasury bill if the rate is high than to lend to customers who may default and by so doing reducing their risk exposure hence more solvent.

Again, this study revealed significantly negative relationship between liquidity and the Z-score. This means as bank's liquidity increases the bank turns to be insolvent. This could be attributed to the fact that more liquid banks are in the position to take up more profitable but riskier opportunities and avenues as they come, which in effect make them more riskier and

less solvent. Therefore less liquid banks are far from bankruptcy but more liquid banks are closer to bankruptcy.

#### 4.5 Stress Test And Risk-Taking

**Figure 4.2 Awareness Of Stress Test By Bank Of Ghana**



Responses From Banks

Source: Field of study, 2013.

**Table 4.7 Banks Participation In The Stress Test By The Bank Of Ghana**

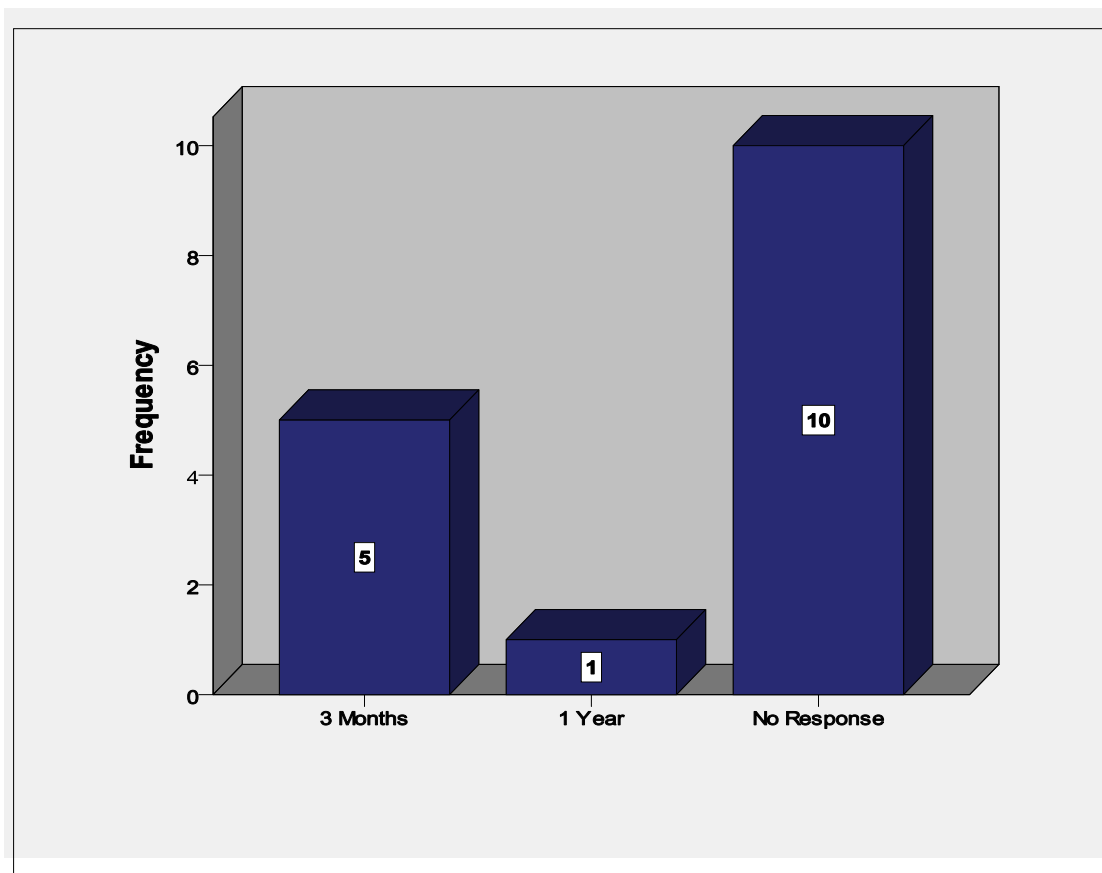
Responses	Frequency	Percent	Valid Percent
YES	10	62.5	62.5
NO	6	37.5	37.5
Total	16	100.0	100.0

Source: Field of study, 2013.

**Table 4.8 Frequency Of Participation By Banks**

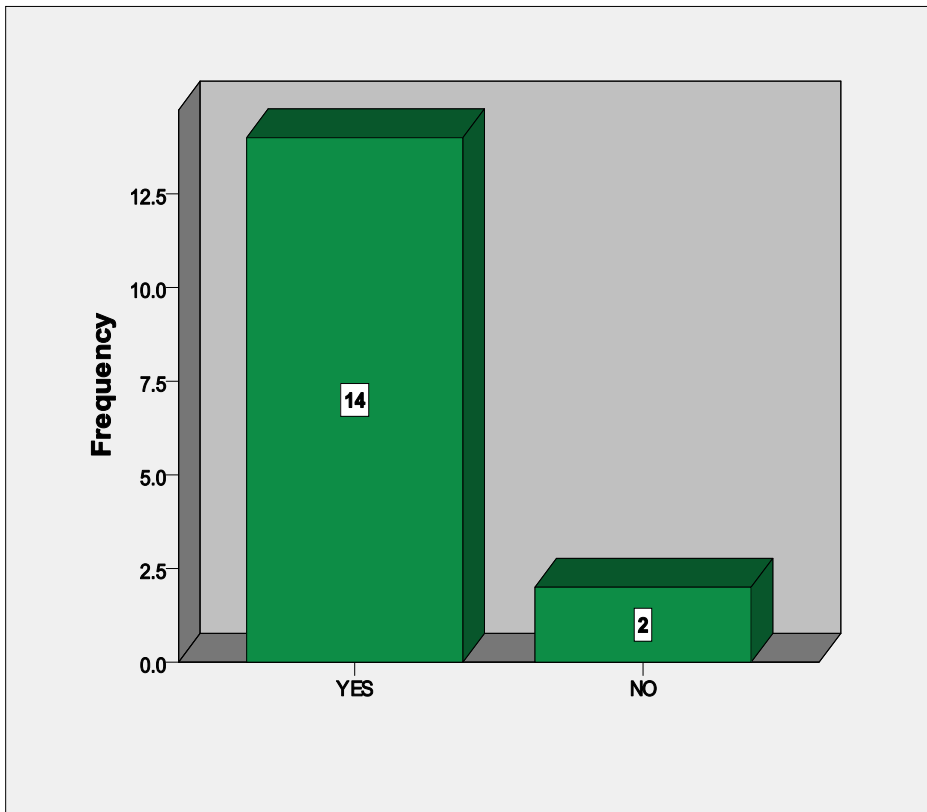
Responses	Frequency	Percent	Valid Percent
Monthly	9	56.3	56.3
No Response	7	43.8	43.8
Total	16	100.0	100.0

Source: Field of study, 2013.

**Figure 4.3 Duration Of Getting Stress Test Result From Bank Of Ghana**

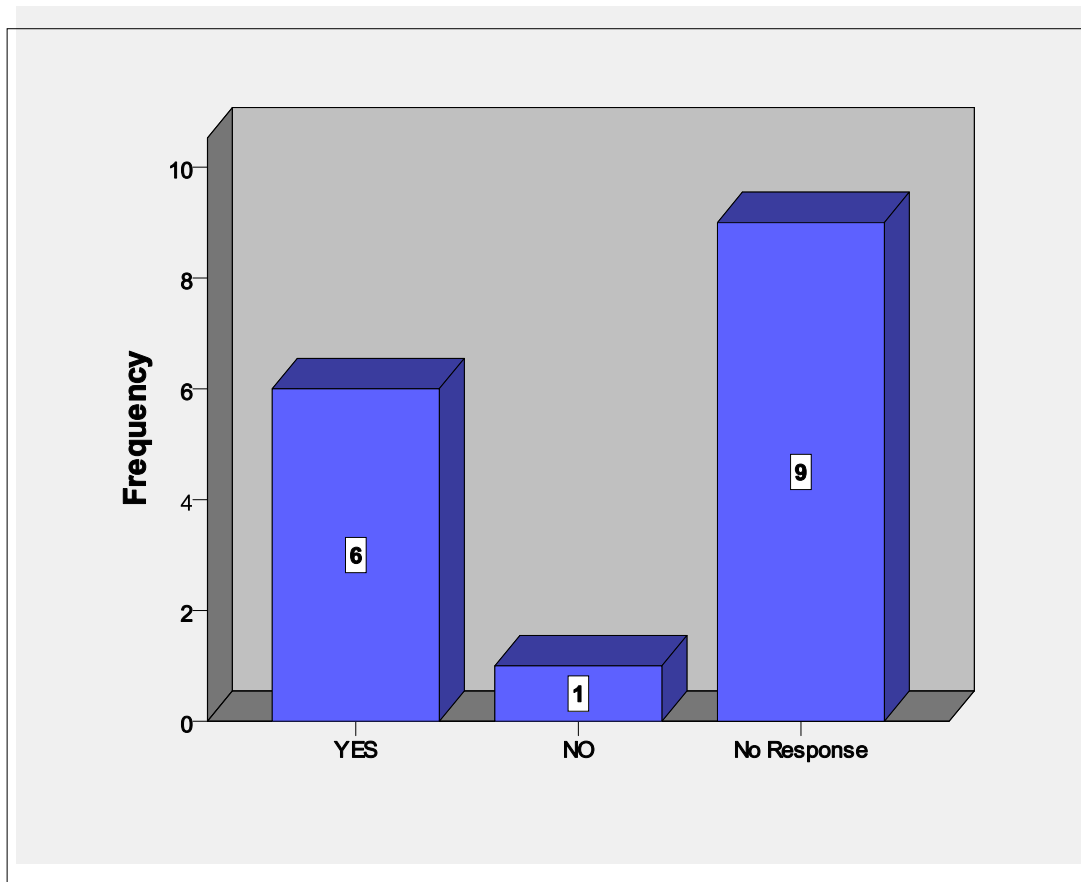
Duration Of Results

Source: Field of study, 2013

**Figure 4.4 Internal Stress Test Undertaken By Individual Banks**

**Internal Stress Test**

**Source: Field of study, 2013**

**Figure 4.5 Factoring Bog Stress Test Results Into Risk Management Policies****Stress Test Into Risk Management Policies**

Source: Field of study, 2013

The bar graph in figure 4.2 shows the extent to which the sample banks are aware of the stress test exercise conducted by Bank of Ghana. As indicated by the bar graph in figure 4.2, 10 out of 16 respondents are aware of BOG stress test exercise. Showing greater percentage of the sample banks is aware of BOG stress test.

Also, the graph in figure 4.3 indicates how long it takes for the banks to get result of the stress test. From the graph only 5 out of 16 banks receive result from BOG in 3 months' time after the exercise while 1 bank receives it within a year. However, greater percentage of the sample banks indicated that they do not receive BOG stress test result.

Figure 4.4 bar graph depicts the extent to which the individual banks of the sample have been conducting internal stress test. 14 out of 16 banks conduct internal stress test exercise, meaning internal stress test is widely applied by banks in Ghana.

The extent to which the sample banks factor BOG stress test result in their risk management policies is indicated by figure 4.5 bar graph. 6 out of 16 banks factor in BOG stress test result in their risk management policies. As indicated earlier, greater percentage of the sample banks do not receive BOG stress test result hence not factoring it in risk management policies.

Table 4.7 and 4.8 show banks participation and their frequency of participation in BOG stress test exercise. From table 4.7, 10 out of 16 banks indicated that they participate in the stress test exercise. Table 4.8 also shows that 9 banks participate in BOG stress test exercise monthly. However, according to Bank of Ghana, the stress test is conducted for all the banks using data from the monthly report sent to Bank of Ghana by individual banks. Also, information obtained from Bank of Ghana indicates that the stress test is conducted every six month.

## CHAPTER FIVE

### SUMMARY, CONCLUSION AND RECOMMENDATIONS

#### 5.1 Introduction

This study examined the risk-taking behaviour of banks, the relationship between disclosure and risk-taking of banks and the relationship between stress testing and risk-taking of banks in Ghana. This chapter therefore presents the summary and conclusion of the findings from the study and the recommendations.

#### 5.2 Summary

Since the occurrence of the global financial crises, stress testing has become a popular risk management tool in the banking industry. Also there is a theory that greater disclosure and enhanced market discipline leads to reduced risk-taking. The regulatory bodies are therefore calling on the banks to disclose more information to their stakeholders so as to ensure efficient (reduced) risk in the banking industry. The question that comes to mind is that, are the risk exposures of the banks reducing as they disclose more information. It is in line with this that this study examined the influence of stress testing, and disclosure on risk-taking of banks in Ghana.

The ratio of non-performing loans to total loans was used as a measure of risk to examine the risk-taking behaviour of banks in Ghana for the period under study (2007-2011). The risk-taking behaviour of banks in Ghana is found to be a mixture of decreasing and increasing risk pattern. The study revealed that, in Ghana, the election year and the immediate subsequent year are characterised by an increase in non-performing loan. This is because government borrows more money internally and increases its expenditure in order to get more votes. After the election, the government then realises it has no money in the coffers to pay for the loans

borrowed hence resulting in a vast increase in non-performing loan. Therefore the risk-taking behaviour of banks in Ghana is affected by the election cycle.

The study made use of a panel regression model and relate risk-taking to disclosure, controlling for bank size, profitability, liquidity and treasury bill rate. Disclosure scores from a disclosure index are used to proxy for disclosure, likewise Z-score to proxy for total risk.

From the result, disclosure is significantly negatively related to Z-score which is a measure of risk-taking. This indicates that greater disclosure is associated with more risk-taking and less disclosure is associated with less risk-taking. Meaning as disclosure increases risk taking also increases hence making the banks more risky. That is, the higher the disclosure the higher the risk-taking (less sound) of the banks. Therefore, there is positive relationship between disclosure and risk-taking. This is contrary to disclosure theory which states that greater disclosure and enhanced market discipline leads to reduced risk. The justification may be that market discipline is not enhanced (ineffective) in Ghana. However, the result is consistent with what Cordella & Yeyati (1998) indicated that when banks do not control their risk exposure, the presence of informed depositors may increase the probability of bank failures (more risky) which confirms the issue of market discipline as in disclosure theory.

The result of this study revealed bank size is economically and conventionally not significant in influencing risk-taking behaviour of banks in Ghana.

The study found significantly positive relationship between profitability and Z-score, indicating that, profitability has significant influence on risk-taking of banks in Ghana. The result showed that more profitable banks are less risky and less profitable banks are more risky. Treasury bill was found to have statistically significant positive relationship with the Z-score, implying that treasury bill has significant influence on risk-taking of banks in Ghana. That is, as treasury bill rate increases risk-taking of banks decreases and as treasury bill rate

decreases risk-taking of banks increases. The study revealed significantly negative relationship between liquidity and the Z-score. This means as bank's liquidity increases the bank turns to be more risky.

The results of this study have delivered some insights on stress testing and risk-taking of banks in Ghana. Greater percentage of the sample banks showed that they are aware of stress test exercise conducted by Bank of Ghana. However, greater percentage of the sample banks indicated that they do not receive Bank of Ghana stress test result. Also, 14 out of 16 banks showed that they conduct internal stress test exercise, meaning internal stress test is widely applied by banks in Ghana.

As indicated earlier, greater percentage of the sample banks do not receive Bank of Ghana stress test result hence not factoring it in their risk management policies. Again, information obtained from Bank of Ghana showed that, the stress test is conducted for all the banks using data from the monthly report sent to Bank of Ghana by individual banks. Also, Bank of Ghana conducts the stress test exercise every six month.

However, the central bank discloses the results of the stress test to the individual banks as and when it becomes necessary. Therefore one can deduce that, in Ghana, the banks mainly consider the internal stress test results in their risk management policies and not that of the central bank. Also not all the banks conduct internal stress test exercise. Stress testing is therefore a new phenomenon in Ghana banking industry.

### **5.3 Conclusion**

Contrary to expectation, the regression results indicate that greater disclosure is associated with more risk-taking while lesser disclosure is associated with reduced risk-taking. This implies that market discipline is not effective in Ghana. Also, it was found that bank size is not important in influencing risk-taking behaviour of banks in Ghana. Besides, the researcher introduced treasury bill rate as a control variable for the first time and the results are economically meaningful and as well as statistically significant in influencing risk-taking of banks in Ghana. The banks in Ghana mainly consider the internal stress test results in their risk management policies and not that of the central bank hence the stress test conducted by the central bank (Bank of Ghana) does not influence the risk-taking behaviour of banks in Ghana.

### **5.4 Recommendations**

Based on the results of this study, it is suggested that the central bank comes out with policies and warning signals that will induce individual banks to limit loans and advances they give out in election years or prior to election years. Also, policy makers should ensure that sufficient relevant and reliable risk information is disclosed by the banks so as to enable stakeholders assess the risk profile of the banks for effective decision making. Also, public lectures should be used as platform to educate stakeholders on their role in ensuring effective risk management at individual bank level. That is, strategies should be put in place to educate stakeholders of banks for effective market discipline. Again, policy makers should come out with strategies to ensure that individual banks conduct internal stress test exercise and change their risk management policies in accordance with the stress test result.

Further studies should look at the determinants of disclosure for banks in Ghana. Also, it is recommended that the relationship between disclosure and efficiency of banks should be

examined. Again, the extent of disclosure and market discipline in the Ghanaian banking industry should be investigated by future researchers.

## REFERENCES

- Acharya, V., & Naqvi, H. (2012).** The seeds of a crisis: A theory of bank liquidity and risk taking over the business cycle. *Journal of Financial Economics*, pp 349-366.
- Agoraki, M. E. K., Delis M. D. & Pasiouras F. (2011).** Regulations, competition and bank risk-taking in transition countries. *Journal of Financial Stability*, 7(1), pp.38-48.
- Amediku, S. (2007).** Stress tests of the Ghanaian banking sector: A VAR approach. *Monetary Policy Analysis and Financial Stability Department, Bank of Ghana, Working Paper/Bank of Ghana (BOG)*, pp1-37.
- Anderson, R. C., & Fraser, D. R. (2000).** Corporate control, bank risk taking, and health of the banking industry. *Journal of Banking & Finance* Volume 24, Issue 8, August 2000, Pages 1383–1398.
- Baiman, S., & Verrecchia, R. (1996).** The relation among capital markets, financial disclosure, production efficiency, and insider trading. *Journal of Accounting Research*. pp1-22.
- Barako, D. G. (2004).** Factors influencing voluntary corporate disclosure by Kenyan companies corporate governance. *An International Review*, volume 14 (2), 107-125.
- Bashir, A. H. M. (1999).** Risk and profitability measures in Islamic banks: the case of two Sudanese banks. *Islamic Economic Studies*, 6(2), 1-24.
- Baumann, U. & Erlend, N. (2004).** Disclosure, volatility, and transparency: An empirical investigation into the value of bank disclosure. *Federal Reserve Bank of New York Economic Policy Review*, pp 31-45.

**Bischof, J., & Daske, H. (2012).** Mandatory supervisory disclosure, voluntary disclosure and risk –taking of financial institution: Evidence from EU. *New York Financial Services*.

**Blaauw, A. (2009).** Basel II and Credit Ratings [Online] Available at: [http://www.ubagroup.com/userfiles/file/exec\\_insights. Basel% 20II% 20and% 20Credit% 20Ratings. pdf](http://www.ubagroup.com/userfiles/file/exec_insights.Basel%20II%20and%20Credit%20Ratings.pdf).

**Bliss, R. R., & Flannery, M. J. (2002).** Market discipline in the governance of companies. *Corporate governance: An International Review*. Volume 14 (2), 107-125

**Blum, J. M. (2002).** Subordinated debt, market discipline, and banks' risk taking. *Journal of banking & finance*, 26(7), pp.1427-1441.

**Botosan, C. A. (1997).** Disclosure level and the cost of equity capital. *Accounting Review* 72, no. 3 pp 323-49.

**Boyd, J. & De Nicolo, G. (2005).** The theory of bank risk taking and competition revisited. *Journal of Finance*, 60 pp. 1329–1343

**Bushee, B. J., & Noe, C. F (2000).** Corporate disclosure practices, institutional investors and stock return volatility. *Journal Accounting Research*, 38 pp. 171-202

**Bushee, B., Matsumoto, D. & Miller G. (2003).** Open versus closed conference calls: The determinants and effects of broadening access to disclosure. *Journal of Accounting and Economics* 34 pp.149-180.

**Cheyne, E. (2012).** A theory of voluntary disclosure and cost of capital. *Social Science Research Network*, 134-154

**Committee on the Global Financial Systems (2000).** Stress testing by large financial institutions: Current practice and aggregation issues. Available at [www.bis.org/publ/cgfs14.htm](http://www.bis.org/publ/cgfs14.htm)

**Cordella, T., & Yeyati, E. L. (1998).** Public disclosure and bank failures. *Staff Papers-International Monetary Fund*, 110-131.

**Demsetz, R. S., & Strahan, P. E. (1997).** Diversification, size, and risk at bank holding companies. *Journal of Money, Credit, and Banking*, 300-313.

**Djankov, S. R., La Porta F., Lopez-de-Silanes, & Shleifer, A. (2003).** Economic consequence of mandatory disclosure. *Quarterly Journal of Economics* 118 pp. 453-517.

**Feltham, G., Gigler, F. & Hughes, J. (1992).** The effects of line-of-business reporting on competition in oligopoly settings. *Contemporary Accounting Research* 9 pp.1-23.

**Fishman, M. & Hagerty, M. (1989).** Disclosure decisions by firms and the competition for price efficiency. *Journal of Finance* 44, pp.633-646.

**Flannery, M. J. (2001).** The faces of “market discipline. *Journal of Financial Services Research*, pp.107-119.

**Francis, J., Nanda, D. & Olsson P. (2005).** Voluntary disclosure, information quality, and costs of capital. *Duke University Working Paper*.

**Frankel, R., Johnson, M. & Skinner, D. (1999).** An empirical examination of conference calls as a voluntary disclosure medium. *Journal of Accounting Research* 37, pp.133-150.

**Gal-Or E. (1985).** Information sharing in oligopoly”, *Econometrica*, pp329-343.

**Garleanu, N., & Pedersen, L. (2004).** Adverse selection and the required return. *Review of Financial Studies* 17, pp.643-665.

**Ghazali, N. A., & Weetman, P. (2006).** Perpetuating traditional influences: Voluntary disclosure in Malaysia following the economic crisis. *Journal of International Accounting, Auditing and Taxation*, 15(2), pp.226-248.

**Ghosh, S. & Das, A. (2000).** Market discipline in the Indian banking sector: An empirical exploration. *NSE Research Initiative, NSE: Mumbai*.

**Greenspan, A. (2001).** The Federal safety net. *The financial safety net, Chicago: Federal Reserve Bank of Chicago*, 1-8.

**Hail, L. (2003).** The impact of voluntary corporate disclosures on the ex ante cost of capital for Swiss Firms. *European Accounting Review* 11, pp.741-743.

**Hayes, R., & Lundholm, R. (1996).** Segment reporting to the capital market in the presence of a competitor. *Journal of Accounting Research* 34, pp.261-279.

**Healy, P. M., & Palepu, K. G. (2001).** Information asymmetry, corporate disclosure, and the capital markets: A review of the empirical disclosure literature. *Journal of Accounting and Economics*, 31 (1-3), pp.405-440.

**Healy, P., Hutton, A. & Palepu, K. (1999).** Stock performance and intermediation changes surrounding sustained increases in disclosure. *Contemporary Accounting Research* 16, pp.485-520.

**Hirst, D., Koonce, L. & Venkataraman, S. (2008).** Management earnings forecasts: A review and framework. *University of Texas Working Paper*.

**Hirtle, B. (2007).** Public disclosure, risk, and performance at bank holding companies. *Staff Report, Federal Reserve Bank of New York*, No. 293.

**Ho, S. S. M., & Wong, K. S. (2001).** A study of corporate disclosure practices and effectiveness in Hong Kong. *Journal of International Financial Management and Accounting*, 12(1), pp 75-101.

**Hossian, M. (2008).** The extent of disclosure in annual reports of banking companies: The Case of India. *European Journal of Scientific Research*, pp. 659-680.

**Hsiao, C. (2003).** *Analysis of Panel Data* (Vol. 34). Cambridge University Press. Available at <http://bilder.buecher.de>

**Huiyun, L. & Peng, Z. (2012).** Factors influencing voluntary disclosure of China listed companies. *American Accounting Association, Research Interaction Forum* 111.

**Issa, H., & Ouattara, B. (2005).** The effect of private and public health expenditure on infant mortality rates: does the level of development matters. Department of Economics, University of Wales, UK.

**Isshaq, Z., Bokpin, G. A., & Amoah, B. (2012).** Efficiency and risk-taking behaviour of Ghanaian banks. *Research in Accounting in Emerging Economies*, 12, pp.53-74.

**IMF (2012).** Macrofinancial stress testing: Principles and practices-background material. Available at SSRN 2157214.

**Kirdy, A. (1988).** Trade associations as information exchange mechanisms. *RAND Journal of Economics* 19, pp.138-146.

**Konishi, M. & Yasuda, Y. (2004).** Factors affecting bank risk taking: Evidence from Japan. *Journal of Banking & Finance*, 28(1), pp.215-232.

- Laeven, L., & Levine R. (2009).** Bank governance, regulation and risk taking. *Journal of Financial Economics*, Volume 93, Issue 2, pp.259–275.
- Lang, M. & Lundholm, R. (1993).** Cross-sectional determinants of analyst ratings of corporate disclosures. *Journal of Accounting Research* 31, pp.246-271.
- Lang, M., & Lundholm, R. (1996).** Corporate disclosure policy and analyst behaviour. *Accounting Review* 71, pp.467-492
- Leuz, C., & Wysocki, P. (2008).** Economic consequences of financial reporting and disclosure regulation: A Review and Suggestions for Future Research. *Working paper, University of Chicago.*
- Linsley, P. M., & Shrivess P. J. (2005).** Transparency and the disclosure of risk information in the banking sector. *Journal of Financial Regulation and Compliance*, Vol. 13 Iss: 3, pp.205 – 214.
- Lobo, G. J., & Zhou J. (2001).** Disclosure quantity and earning management. *Asia pacific Journal of accounting and economics Symposium, Hong Kong.*
- Lundholm, R. & Winkle, M. V. (2006).** Motives for disclosure and non-disclosure: A framework and review of the evidence. *Accounting and Business Research*, 36 pp.43-48.
- Mahoney, P. (1995).** Mandatory disclosure as a solution to agency problems. *The University of Chicago Law Review* 62, pp.1047-1112.
- Mallin, C., & Ow-Yong, K. (2012).** Factors influencing corporate governance disclosures: evidence from Alternative Investment Market (AIM) companies in the UK. *The European Journal of Finance*, 18(6), 515-533.

**Merton, R. C. (1987)**, A simple model of capital market equilibrium with incomplete information. *Journal of Finance* 42, pp483.

**Mohd Ghazali, N. A., & Weetman, P (2006)**. Perpetuating traditional influences: Voluntary disclosure in Malaysia following the economics crisis. *Journal of International Accounting, Auditing and Taxation*, 15(2), 226-248.

**Nagar, V., Nanda, D., & Wysocki, P. (2003)**. Discretionary disclosure and stock-based incentives. *Journal of Accounting and Economics* 34, pp.283-309.

**Nayda, W. (2012)**. Enterprise risk-taking the mystery out of stress testing ERM. *RMA Journal*, 94(10), 20.

**Nier, E., & Baumann, U. (2003)**. Market discipline, disclosure, and moral hazard in banking. *In Proceedings of the 2003 Conference on Bank Structure and Competition*. Chicago: Federal Reserve Bank of Chicago.

([http://www.chicagofed.org/news\\_and\\_conferences/conferences\\_and\\_events/files/2003\\_bank\\_structure\\_market\\_discipline\\_disclosure.pdf](http://www.chicagofed.org/news_and_conferences/conferences_and_events/files/2003_bank_structure_market_discipline_disclosure.pdf)).

**OSFI (2009)**. Towards a stress-testing model Consistent with the macroprudential approach. *Financial System Review*. Available at [certerforfinancialstability.com](http://certerforfinancialstability.com)

**Oura, H. (2012)**. Macrofinancial stress testing: Principles and practices-background material. Available at SSRN 2157214.

**Papo, A. (2008)**. Aspects regarding corporate mandatory and voluntary disclosure. *Journal of International Accounting*.

**Pérignon, C., & Smith, D. R. (2008)**. The level and quality of value-at-risk disclosure by commercial Banks. *Simon Fraser University*. Available at SSRN: <http://ssrn.com/abstract=952595>.pp.14-30

**Putu, I., Sanjaya, S., & Young, L. (2012).** Voluntary disclosure and earnings management at companies listed in Indonesia stock exchange. *USA Business Review. Review* 6, 361-395.

**Rock, E., (2002).** Securities regulation as lobster trap: A credible commitment theory of mandatory disclosure. *Cardozo Law Review* 23, pp.675-704.

**Rouf, A. & Harun, A. (2011).** Ownership structure and voluntary disclosures. *Pak. J. Commer. Soc. Sci.* Vol. 5 (1), pp.129-139.

**Savvides, S. C., & Savvidou, N. (2012).** Market risk disclosures of banks: a cross-country study. *International Journal of Organizational Analysis*, 20(4), 379-405.

**Schuermann, T. (2012).** Stress testing banks. *Available at SSRN 2041579*.

**Shleifer, A. & Wolfenzon, D. (2002).** Investor protection and equity markets. *Journal of Financial Economics* 66, pp.3-27.

**Sidak, J. (2003).** The failure of good intentions: The worldcom fraud and the collapse of American telecommunications after deregulation. *Yale Journal of Regulation* 20, pp.207-267.

**Sorge, M. (2004).** Stress-testing financial systems: An overview of current methodologies *Working paper no. 165*, Monetary and Economic Department, Bank for International Settlements (<http://www.bis.org/publ/work165.htm>).

**Stigler, G. (1971).** The theory of economic regulation. *Bell Journal of Economics and Management Science* 2, pp.3-21.

**Verrecchia, R. (1983).** Discretionary disclosure. *Journal of Accounting and Economics* 5, pp.179-194.

**Verrecchia, R. (2001).** Essays on disclosure. *Journal of Accounting and Economics* 32, pp.97-180.

**Wang, K., Sewon, & Claiborn, O. M. (2008).** Determinants and consequences of voluntary disclosure. *Journal of International Accounting, Auditing and Taxation*

**Ware, T., & Shek, H. (2012).** Bill Phelan. *Available at*

[Paynetonline.com/portals/o/././absolutepd-stress-test-whitepaper.pdf](http://Paynetonline.com/portals/o/././absolutepd-stress-test-whitepaper.pdf)

**Welker M. (1995).** Disclosure policy, information asymmetry, and liquidity in equity markets. *Contemporary Accounting Research* 11, pp801-827.

## APPENDICES

### APPENDICES 1 – BANK OF GHANA STATUTORY AUDIT DISCLOSURE

#### REQUIREMENT

##### **Statutory audit report and disclosure requirements**

The Bank of Ghana requires the financial statements to be prepared in accordance with the International Financial Reporting Standards (IFRS) and should include the following:

- (a) Capital Adequacy Ratio showing Tier1 capital, Tier 2 capital and capital charges for credit, operational and market risk;
- (b) Non-performing loans (amount and ratio);
- (c) Statutory liquidity breaches and non-compliance with other prudential requirements
- (d) Dominant risks of the bank and how they arise, giving an indication as to whether they; are increasing, decreasing or stable over the two-year period;
- (e) Risk governance structure;
- (f) Risk measurement for credit risk, liquidity risk, interest rate risk, foreign exchange rate risk, operational risks, and other major risks;
- (g) Subsidiaries and other affiliated companies;
- (h) Amount of loans written-off;
- (i) Credit risk reserve, if any and how the credit risk reserve was arrived at;
- (j) List of related parties;
- (k) Transactions with related parties, stating whether or not this was at terms not less favourable to the bank than those normally offered to other persons;
- (l) Amount of repossessed properties/collaterals;
- (m) Type and value of assets used as collaterals against liabilities;
- (n) Renegotiated loans which have been reclassified as new loans;
- (o) Year end rates used for foreign exchange translations;
- (p) List of significant shareholders; and
- (q) Any other information that the Bank of Ghana may consider relevant.

## APPENDICES 2 - QUESTIONNAIRE

UNIVERSITY OF GHANA BUSINESS SCHOOL

DEPARTMENT OF FINANCE

QUESTIONNAIRE

1. Is your Bank aware of the Stress Test exercises undertaken by the Bank of Ghana?

Yes

No

2. Does your Bank participate in the Stress Test exercises that are conducted by the Bank of Ghana?

Yes

No

3. How often does your Bank participate in the conduct of Stress Tests by the Bank of Ghana?

Monthly

Quarterly

Bi-annually

Annually

4. How long does it take before your Bank gets access to the outcome of the Stress Test? Within:

1 Month

3Months

6 Months

1 Year

5. Does your Bank undertake any form of internal Stress Tests?

Yes

No

6. Does your Bank consider the outcome of the Stress Test results from the Bank of Ghana in its subsequent Risk Management Policies?

Yes

No

7. Is there a shareholder with 10% or more voting right in your organization?

Yes

No

## APPENDICES 3 – Disclosure index items

### Mandatory disclosure items

1. Capital Adequacy Ratio showing Tier1 capital, Tier 2 capital
2. Capital charges for credit, operational and market risk
3. Non-performing loans ratio
4. Non-performing loans amount
5. Statutory liquidity breaches and non-compliance
6. Dominant risks of the bank and how they arise
7. Risk governance structure
8. Risk measurement for credit risk
9. Risk measurement liquidity risk
10. Risk measurement for interest rate risk
11. Risk measurement for foreign exchange rate risk
12. Risk measurement for operational risks
13. Subsidiaries and other affiliated companies
14. Amount of loans written-off
15. Credit risk reserve
16. Credit risk reserve measure
17. List of related parties
18. Transactions with related parties
19. Terms with related parties
20. Amount of repossessed properties
21. Asset type used as collaterals against liabilities
22. Asset value used as collaterals against liabilities
23. Year end rates used for foreign exchange translations

24. List of significant shareholders
25. New loans
26. Loans and receivables
27. Investment held to maturity
28. Available for sale assets
29. Liabilities at amortised cost
30. Profit and Loss statement

#### Voluntary disclosure items

1. Magnitude of credit risk exposure
2. Quality of current loans
3. Credit ratings process
4. Schedule of non-performing loans
5. Risk management process
6. Made mention of stress testing
7. Brief history of bank
8. Description of business activities
9. Address and webpage
10. Future strategy
11. Details of chairman
12. Details of directors
13. Number of shares held by directors
14. Liquidity position
15. Dividend per share
16. Description of market Risk

17. Concentration of depositors
18. Accounting Standard applied
19. Branches and their locations
20. ATM locations
21. Chairman's report
22. International banking facility
23. Performance displayed in a graph form