ST. CLEMENTS UNIVERSITY

THIS IS A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT FOR THE AWARD OF A DOCTOR OF PHILOSOPHY (PhD) DEGREE IN FINANCE

TOPIC:

SYSTEMIC RISK AND CAPITAL ADEQUACY OF BANKS AND NON BANK FINANCIAL INSTITUTION IN GHANA

BY
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APPROVAL PAGE

This is to certify that this research project was carried out under our strict supervision and has been approved for submission to the Department in partial fulfillment of the requirements for the award of Doctor of Philosophy (PhD) Management of St. Clements University.

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I, Joseph Odarquaye France do hereby declare that this work is entirely my own effort and where works of other persons have been used or referred to, the sources have been duly acknowledged.

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Sign.

DEDICATION

This project is dedicated first and foremost to:

Jesus, the Almighty God, who has made it possible for me to access the program and successfully saw me through it to the end;

To my parents of blessed memory Mr. Amos Lante France and Madam Paulina Ofori;

To my lovely wife, Mrs. Anna Sabina France; and

Finally, to my lovely children: Jessica Naa Lamiley France, Jason Nii Lante France and Janice Naa Lamiorkor France.

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ABSTRACT

Systemic risk is considered a very important risk in financial markets yet it has least been considered and treated in the financial world. The Basel documents (Basel I & II), considered the most comprehensive banking literature especially on risk management even shied away from it. Though the Basel (I&II) recognised and mentioned systemic risk several times in the literature as very crucial it never attempted to suggest a process of identification, measurement and control of this all important risk. Systemic risk has been defined variously by different researchers, however, the fact that it is a risk which affects not only the individual units but the whole system runs through all the definitions. Systemic risk in finance, which is potentially considered very devastating, should be identified, measured and controlled such that its impact on financial systems could be curbed. The study recognises that the growing complexities of operations and product innovations have made financial institutions progressively exposed to a diverse set of risks, including systemic risk.

The capital adequacy framework (adjusted capital over risky assets) is a celebrated framework for measuring and controlling risk in the banking industry. The framework only considers a charge for the traditional risk factors of credit, operational and market risks. The study however argues that the framework could be expanded to incorporate a charge for systemic risk and could again be extended to other non-bank financial institutions (including investment companies) based on the institutions' size, level of sophistication of products and complexity of operation.

Few researchers have already considered the idea and done some research on it. Persaud and Spratt, 2005 had considered it and related it to the banking industry. Their study however could not establish an objective and scientific framework for the measurement of systemic risk. They only proposed that supervisors should require individual banks deemed to be systemically important to hold additional capital charge of 1% of capital. Viral .A. Archaya, 2000, also tried to capture systemic risk as general risk as per portfolio theorem by likening it to macro economic factors such as interest rate risk, foreign exchange risk or industry risk. His study noted that banks should distinguish between

general risk and specific risk when computing CAR. However, his proposal likens systemic risk to general risk, and therefore did not consider the systemic importance of individual banks with respect to risk. This way each financial institution shall be unfairly subjected to a general charge irrespective of the level of its size, sophistication or complexity it assumes in the financial industry.

To ensure that this all important risk is captured and measured effectively the study seeks to examine a scientific measurement, evaluation and control of risk through the Capital Adequacy Ratio (CAR) framework. It also seeks to expand the CAR framework beyond the banking industry to embrace the non-bank financial industry due to similarity of products being offered by the financial institutions lately. The study again argues that the major financial risk factors (credit, operational, market etc.) are inter-related and could collectively produce a synergy which could grow in astronomical and (or) exponential proportions as the institution grows in size and becomes more complex. This could therefore form the basis for the computation of systemic risk. Besides, banks may be more prone to one risk factor than the other depending on the nature of their products, level of sophistication and complexity. The study also seeks to suggest the introduction of gearing (Equity/total liabilities) to supplement the CAR in the banking industry since the CAR only concentrates on the asset side of the balance sheet leaving the liability side.

The study is therefore deemed to have come handy as the world faces global recession due mainly to escalation of systemic risk in the financial markets. A charge for systemic risk through the capital adequacy framework based on synergies created by the traditional risk factors recognising the systemic importance of financial institutions can therefore not be gainsaid.

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CHAPTER ONE

1.0 INTRODUCTION

1.1 BACKGROUND

Introduction

Systemic risk has always been considered in financial markets as a very important risk, if not the most important risk. It has the real potential to collapse the economies of countries and even bring down the entire global financial system. It has been defined variously by different researchers and mean different things to different people. Yet one thing is common in all these definitions; it is a risk caused to the whole system rather than a single unit. It is a risk which is considered potentially very devastating yet has not attracted the needed attention in financial risk management (identification, evaluation, measurement, monitoring and control) in financial markets.

The structure of financial markets in recent decades is believed to have changed from bank-based to market-based financial system yet crisis management have not kept pace with these changes.(Alexander, Eatwell, Persaud and Roech, 2007). Systemic risk is also considered as the basic economic concept for understanding financial crisis. (De Brandt and Hartmann, 2000).

Definitions of systemic risks

Systemic risk in a very general sense is not a phenomenon limited to economics or the financial system. The most natural illustration of the concept might be in the area of health and epidemic diseases[1]. HIV AIDS, Malaria, H1N1 (Swine flu) infections, are but a few health related systemic risks that the world has witnessed over the years. Systemic risk could even be extended to dangers and atrocities of terrorists' activities which have been rampant and widespread in recent years. The

[1] These are severe cases (e.g. the Great Plague in the Middle Ages) of widespread contamination which may wipe out a significant portion of the population.

fact that everybody seems to be at risk, including the perpetuators of such heinous criminal activities themselves qualifies such acts and the risk associated with them as systemic. In the area of economics, it has been argued that systemic risk is a particular feature of financial systems. (De Brandt and Hartmann, 2000).

At the macro (national and global) level of economics and finance, systemic risk is defined as "…the risk or probability of breakdowns in the entire system, as opposed to breakdown in individual parts or components and is evidenced by co-movements among most or all the parts." (Kaufman & Scott, 2002). Bartholomew & Whalen 1995 refer to systemic risk as "…an event having effect on the entire banking, financial, or economic system rather than just one or few institutions." Systemic risk is again referred to as "…the risk of a sudden, usually unexpected, disruption of information flows in financial markets that prevents them from channelling funds to those who have the most productive profit opportunities." (Mishkin 2007)[2].

Yet systemic risk is defined at a micro (institutional) level by Kaufman 1995 as "…the probability that cumulative losses will accrue from an event that sets in motion a series of successive losses along a chain of institutions or markets comprising a system. That is, systemic risk is a chain reaction of falling interconnected dominos."

Systemic risk at the micro level is considered less potent to causing havoc as compared to the macro level. However, where the system is highly interdependent and complex, what is considered systemic risk at the institutional level could assume global dimensions and degenerate into breakdowns of the entire system of the world.

It is clear from the above definitions that the more interrelated or interdependent and sophisticated or complex a system is, the more risky that system, as a whole,

[2] Frederic S. Mishkin is currently a member of the Board of Governors of the US Federal Reserve System.

could be. Any adversity of one part could easily be transferred or replicated in other parts of the system, culminating in the incapacitation and sometimes the collapse of the entire system.

Levels of Interdependence & Systemic risk

Globalisation has made it intrinsically difficult for financial markets of the various economies to be decoupled from one another. Cross border trade among banks and other financial institutions has sharply increased over the past few years. International trade, global markets, offshore banking, international financial service centres etc. have variously been used by financial institutions and countries to describe the levels and aspects of cross border activities in their respective institutions or countries. Regulators are likely to take sub-optimal decisions if they base their decisions of the financial industry on activities of individual institutions without considering the effect on the system as a whole. "A regulatory mechanism that is based only on a bank's own risk and ignores the externality of a bank's actions may leave collective risk-shifting incentives unattended and can, in fact, severely accentuate systemic risk." (Viral .V. Archaya, 2000). At the micro level the significance of interdependence in the breakdown of financial systems becomes very relevant when products which happen to be the generis of the havoc are found on most balance sheets of institutions. In times of systemic crisis therefore the institutions which are immediately and directly affected are those that have traded in the products in question and have maintain them on their balance sheet irrespective of their geographic locations. In situations like this, the first reaction of an individual institution is to absorb the losses if it has a strong balance sheet. It is only when it fails to absorb that it gives signals to the public that it is in trouble. It follows from this that where a number of the institutions in this situation have weak balance sheet, they will all inject the same reaction to the public and this will set the basis of the breakdown assuming macro dimensions. Once the risk assumes a macro dimension, the regulatory authorities and government cannot but inject funds into the system to salvage institutions, especially those of systemic importance.

Northern Rock Mortgage Bank for instance which had directly participated in the securitised products, had a weak balance sheet and besides depended on wholesale funds to operate. The famous 'A-life saga' which succeeded in collapsing two of the quasi state-run banks in Ghana (Ghana Co-operative Bank and Bank for Housing and Corporation) attests to the fact that a well capitalised bank could withstand systemic crisis if it is able to absorb the losses from dealing in bad products or abnormal activities. This is because in the 'A-life saga' the third state institution (Ghana Commercial Bank), the biggest bank in Ghana, which could have collapsed from the effects of the saga managed to survive not because of any external intervention by way of injection of funds by the central bank or the government, but mainly because it had a strong balance sheet to directly absorb the losses. A collapse of Ghana Commercial Bank could have grinded the whole banking system in Ghana to a halt.

As already noted, the recent sub-prime mortgage debacle and the effect on the world economy (the global financial crisis) is enough prove of the debilitating nature of systemic risk as cross border activities intensify. The global financial crisis which started as a harmless dereliction of duty on the part of lenders and (or) Deposit Money Banks by allowing estate agents to assess borrowers or mortgagees turned out to be a very dangerous phenomenon which managed to cause untold havoc to the world economy. It is generally believed that the estate agents did what they did because they were in the business of selling houses and needed to sell more houses to make more money and hence once they did not bear the brunt of having to suffer possible risk of non payment of debt by the borrowers, they did not care a hoot about who got a house through the scheme. It is again generally believed that since the banks had decided the loans were to be sold to other financial institutions and, for which the transaction would not register on their balance sheets, they did not appear too worried about whether a good job was done or not in the assessment of the buyers of the houses. Again, it is generally believed that the investment houses who bought the sub-prime mortgage loans from the banks were also not too worried because they

repackaged them into bits and pieces of financial instruments with the mortgages as the underlying (securitisation) and sold all over the world to other investors. It is also generally believed that the complex nature of the derivative products created from the initial transactions made it difficult for regulators to appreciate the transaction, let alone crafting any form or regulation to control them. Some researchers including (Alexander, Eatwell, Persaud and Roech, 2007) also believe that the focus of regulation was on institutions rather than markets.

It is now common knowledge that the world is a global village and hence countries are no longer considered to be related based on how close they are geographically, but how connected their activities are. Firms may be located in the same country or share a wall but may individually respond to effects of foreign firms outside their shores.

Financial Risk Management & Capital Adequacy Regulation

Capital Adequacy Ratio (CAR) is the relationship of the adjusted capital of banks to their risk weighted asset (risky assets and other risk components, involving mainly credit risk, market risk and operational risk capital charges) base. (Banking Act of Ghana, 2004 (Act 673), as amended). The CAR framework was mainly meant to strengthen banks and therefore safeguard depositors especially in economies where there is no deposit insurance. Capital, especially equity capital is very crucial in a bank's risk management practices. "When a financial institution is forced to have a large amount of capital, it has more to lose if it fails and is thus less likely to engage in risky activities. In addition, equity capital in itself reduces the probability of failure because it provides a cushion to withstand adverse effects on the institution's balance sheet." (Mishkin, 1999).

The capital adequacy ratio is also used to boost or strengthen certain sectors of the economy. For instance in Ghana the risk weights of the export and real estate sectors have been reduced significantly so as to encourage banks to advance credits to those sectors. The capital adequacy ratio framework again helps to

determine the structure of balance sheets of banks. For instance, in addition to other motivations, such as returns, from investing in particular assets the capital adequacy ratio framework helps to determine the structure of assets investments. Why would one invest so much in fixed assets which has a very high risk weight? The framework has also been designed to capture off-balance sheet items. The framework however does not capture the liability side of the balance sheet. The liability side could equally pose threats to a financial institution and it is imperative that it is controlled. Also the Basel II framework originally did not make adequate provisions for securitised transactions and other off-balance sheet items. Also these securitised transactions were given very favourable ratings even by the rating agencies. The (Bank for International Settlements, 2009) has however recently sought to revise the Basel II framework in a document denoted 'Enhancement to Basel II framework by revisiting and strengthening the risk weights to the securitised and other off balance sheet items for which banks are required to comply by December 2010. Different requirements or proposals have been made for different approaches (Internal Rating-based or standardized); however, the button line is that the risk charges must be increased. Again the proposal completely frowned on self-guarantee and would therefore not permit any bank to use ratings for exposures subject to self guarantees. The Basel committee has therefore added language to the Basel II framework such that a bank cannot recognise such ratings. This position is considered both in the Standardized Approach or in the Internal Ratings Based Approach based on guarantees or similar products provided by the bank itself. In other words, the committee concluded that banks should not be allowed to recognise external ratings when those ratings are based on the support provided by the same bank. For instance, "a bank is not permitted to use any external credit assessment for risk weighting purposes where the assessment is at least partly based on unfunded support by the bank. For example, if a bank buys an Asset-backed Commercial Paper (ABCP) and it provides an unfunded securitisation to the ABCP programme (e.g. liquidity facility or credit enhancement), and the exposure plays a role in determining the credit assessment on the ABCP, the bank must treat the

ABCP as if it were not rated. The bank must continue to hold capital against the other securitisation exposures it provides (e.g. against the liquidity facility and/or credit enhancement)". (Bank for International Settlements, 2009). The proposal again sought to give operational requirements for credit analysis, in that, banks will be required to meet specific operational criteria in order to use the risk weights specific to the Basel II securitisation framework. The criteria also intended to ensure that banks perform their own due diligence and do not simply rely on rating agency credit ratings and that failure to meet a given securitisation exposure would result in its deduction. This is fine when a bank is assessing credit, but whose rating should the public rely on, the banks or the rating agency? However, even though the 'Enhancements to Basel II framework', (Bank for International Settlements, 2009) sought to improve the risk mitigation mechanism by increasing the conversion factor it still did not consider the liability side of the balance sheet which is equally important in assessing and addressing the risk associated with the solvency of an institution.

It is generally believed that systemic risk is the primary ingredient to understanding financial crisis and the main rationale for financial regulation, prudential supervision and crisis management. (De Brandt and Hartmann, 2000). In a bid to curtail financial risks, bank supervisors, the world over, have largely adopted the CAR framework of the 'Basel Accords' (Basel I & II)[3] , amongst other measures, for the measurement and the control of risk of the banking institutions and the global financial system as a whole. (Bank for International Settlements, 2006). Basel's' attempt to align regulatory capital of banks to economic capital; that is, relating the actual capital of banks to the risks that they carry is considered very crucial in this regard. (Bank for International Settlements, 2006).

[3] Basel I was originally formed by the banking supervisors of G10 countries in 1988. It was amended into Basel II in 1999.

The Basel I Accord which had the overall objective of strengthening the soundness of international banking system was adopted by the G-10 countries in 1988. It has since been adopted and implemented by a number of countries including emerging countries. (Illing and Paulin 2004). Illing and Paulin 2004, noted that Basel I was revised into Basel II in recognition of widespread financial innovation, the fact that banks have managed their capital requirements in unexpected ways through "capital arbitrage" and generally because of the experience gained with Basel I, etc. Thus, the main additions to Basel I to form Basel II, are to increase the sensitivity of a banks' capital to the risk associated with specific classes of assets (Pillar I), as well as "Supervisory Review process" of banks and "Market Discipline" denoted as Pillar II and III respectively. However with the advent of the global financial crisis it has become apparent that even the revised the Basel II document needs revision. There have recent enhancement to Basel II called 'Enhancement to Basel II framework', but already noted in earlier paragraphs, even this enhancement may be inadequate considering the gaps which existed in the earlier document.

Capital Adequacy Ratio and Pro-cyclicality

"Capital requirements that are sensitive to economic conditions may increase the level of required capital during future economic slowdowns, leading banks to restrict their supply of credit and thereby exacerbating the economic cycle through the induced pro-cyclical behaviour." (Illing and Paulin 2004). This view is shared by many including Elizabeth Fournier 2008 who noted that "Basel II is pro-cyclical, encouraging market highs and lows, and must be changed". She noted that even authors of the Basel are in consonance with her thinking and it is for this reason that the Basel Committee for Banking Practice has publicly acknowledged flaws in the accord and announced a comprehensive strategy to address the weaknesses. She is of the opinion that when Basel II's emphasis on risk-sensitive regulatory capital combined with fair-value accounting required International Financial Reporting Standards (IFRS) distorts balance sheets of banks and leaves them seeming over-capitalised or in sudden need of capital.

A framework of how to tackle capital regulation which takes into account its pro-cyclical effects was proposed by Columba, Cornacchia and Salleo, 2009. They considered four main issues of handing the problem. The first issue they noted was how regulation links risk to capital under the Basel II, capital function. The inputs of the capital adequacy ratio function (i.e. probability of default, loss given default and exposure at risk) are mainly calculated at a point in time rather than through a cycle and therefore would have little effect in smoothing out pro-cyclical capital ratio. They again noted that the approach has a shortcoming of disconnecting capital from risk when pushed to the extreme, thus completely throwing over board the tenets of modern prudential regulation. The second issue that they noted was that risk materialises during slums but accumulates during booms and for this reason the capital base would have reflected and covered loan losses that had not been incurred but was expected (General provision), probably on the basis of the deterioration in credit quality experienced in previous downturns. The researchers therefore proposed the introduction of a credit value adjustment that would stabilise equity through the cycle. On the third issue they noted that Basel II is essentially a micro-economic model, while financial stability is more macro requiring a global outlook on banks and markets. They noted that ideally spill-over effects should be internalised. Brunnermeier et al, 2009 who suggests that computing a macro-prudential risk spill-over factor on the basis of leverage, maturity mismatch, credit and asset price expansion etc, however noted that the weight of each component would be difficult to estimate ex ante. It was again noted that like value-at-risk models, such a factor would use backward-looking data that in most cases tend to underestimate the tail risk and so far there is no reliable way of generating forward looking estimates. In line with the thinking of this study, the paper noted that for supervisory purposes, an alternative which is much robust but simpler indicator of systemic relevance may be preferable. That is larger institutions are exponentially more complex, more interlinked with the financial system and more costly to bail out, therefore one might consider additional capital charge proportional to size and complexity of

operations. The issue as noted by the researchers (Columba, Cornacchia and Salleo, 2009) is that all the measures enumerated may work well during a normal business cycle. They may however not be of help in case of systemic crises. The researchers therefore suggest an "insurance-like approach" which will ensure that banks are provided with funds only when they need it. This way the maintenance of adequate capital will not be too expensive. They thus proposed "a systemic reverse convertible-type security as an alternative. Here they suggested banks could issue bonds that convert into equity given a trigger event, defined by some sector wide indicator, e.g. the industry's aggregate capital ratio that could be published by the supervisory authorities, to avoid moral hazard". The position of (Columba, Cornacchia and Salleo, 2009) combines the reversible convertible described in Flannery, 2005 with the systemic trigger of Kashyap et al, 2008. The argument has however been that obtaining insurance is also at a cost, besides banks could strengthen their balance sheet by holding on to their capital at all times. This in itself could prevent the bank from running into problems in the first place. Finally unlike deposit insurance who have mandate to salvage specific depositors, insurance against capital would too difficult to appropriately define and compute.

The capital adequacy ratio (CAR) has largely been found to be inversely proportional to economic slowdowns and booms. (Illing and Paulin 2004; Columba, Cornacchia and Salleo, 2009). To the extent that most economic slowdowns (recessions) are caused by systemic risk to the financial system resulting in losses, many researchers (Persaud & Spratt, 2005; Archarya 2006 etc.) consider that a capital charge for systemic risk in the CAR framework is worthwhile. Banks keep capital to meet unforeseen or unplanned losses. Planned losses are taken care of in the normal operations of the banks.

If follows from the arguments advanced that seasonality in the financial system is taken care of when banks keep more capital beyond what is required of them or are able to obtain capital when the need arises to curb systemic risk.

Salvaging of Banks & moral hazards

Banks are known to pose systemic risk when they become systemically important (based on size, level of connectivity etc.) to the economies of their countries and to the world at large. (Persaud & Spratt, 2005). They therefore become "too-big-to-fail". It has been argued by many, including renowned financial practitioners and key researches in the academia, that when banks take bad decisions leading to solvency problems they should not be rescued. The question has been whether banks, including systemic important banks, should be salvaged by central banks and governments in the face of imminent collapse irrespective of whether the problem was due to their own folly and recklessness or as a result of uncontrollable system failure. It is for this reason that the debate over the initial decision by the Governor of the Bank of England (Mervyn King) not to salvage the Northern Rock Mortgage bank in the United Kingdom (U.K) in the wake of the sub-prime mortgage debacle (escalating into the 'global financial crisis' and economic recession) emanating from the United States of America (U.S.A) is found intriguing. "…Mr. King also reportedly clashed with the Financial Services Authority over their desire for early intervention to help Northern Rock Mortgage Bank. Mr. King had previously warned the banks that they were accumulating too many bad risks and that it would not be the business of the Bank of England to bail them out." (BBC News 20th Sept. 2007).

The decision of Mervyn King not to salvage banks, particularly, Northern Rock based mainly on the question of the 'moral hazard' that it might create has over the years been shared by many, including the previous Governor of Bank of England, Sir Edward George, Frederic Mishkin (Chairman or the Federal Reserve Bank, New York) and even the Bretton Woods Institutions such as the International Monetary Fund (IMF) and the World Bank. The general view has been that when banks get the impression that they could be salvaged anytime they were in trouble they would not be careful in their dealings and would end up

messing up the financial system. Sir Edward George, 1994 noted that the term "Lender of Last Resort" (LOLR) can be confusing. He states "…the role of the central bank is not to prevent each and every bank from failing and that it is necessary for maintenance of the health of the banking system that there is a possibility of bank failure."(Delston and Campbell, 2002). This view is shared by Mishkin, 2007 who noted that no country is impervious to crises and that the need for Lender-of Last-resort remains strong or important in restoring sanity or stability to crises stricken financial systems. He was, however, quick to add that by LOLR "I mean short-term lending on good collateral to sound institutions, when financial market temporarily seize up. I do not mean rescuing financial market participants from the consequences of their bad decisions by lending to unsound institutions with little capital thereby postponing the recognition of insolvency." It is however obvious from the recent rescue packages of governments of the nations seriously affected by the global financial crisis that the question of collateral or whether bad decisions have been made by financial institutions being rescued does not really matter; what is important is the restoration of the health of the financial system. Most of the financial institutions which were rescued through stimulus packages instituted by the governments of the affected nations had taken bad decisions, they however had to be rescued to halt or curb the crisis. Freddy Mac and Fanny Mae mortgage financial institutions which were at the central point of financing the subprime loans got rescued by the US government not probably because they were quasi government institutions and therefore could not be allowed to fail based on moral and ethical consideration but because of the purported effect they might have on the health of the financial system. Whatever the situation may be, the fact still remains that these institutions could not have been allowed to fail and therefore an alternative would have to be found to salvage them from the crisis. One would wonder why other institutions were allowed to go under whilst others are salvaged. The basic principle has been that once a financial institution assumes systemic importance it poses a threat to the financial system and must therefore be protected from collapsing else it would cause havoc to the financial system. The issue of moral hazard becomes

secondary in this regard. It is for this reason that the strengthening of the capital of institutions has become very imperative. Again for this reason this study proposes that institutions which have assumed systemic importance are given a higher charge than their counterparts which may not contribute much to systemic risk.

Capital Adequacy ratio and Gearing (Leverage) ratio

The capital adequacy ratio (CAR) has been a celebrated mechanism for ensuring the solvency of deposit-taking financial institutions. As noted earlier, it is the ratio of the adjusted capital over risk-weighted assets and other risk charges such as operational and market risk charges. It follows from the definition that the CAR only establishes a relationship of equity to the asset side of the balance sheet. It does not cater for the liability side of the balance sheet. The Gearing or Leverage ratio, on the other hand is the number of times the banks total liabilities exceeds its shareholders funds. Conversely the 'gearing' could be measured in terms solvency margin which is the inverse of the gearing ratio and therefore measures the loss absorption capacity of institutions. Total liabilities in this regard should include off-balance sheet items prevailing netted off against margins captured on the balance sheet. It is expected that where a bank is heavily indebted then this is an appropriate measure. For instance "right before the crisis, some very large institutions that ended up being hard hit had manageable risk-adjusted capital ratios but sky-high leverage". (Columba, Cornacchia and Salleo, 2009). A proposal by the Financial Stability Forum, 2009, has intimated that financial institutions could be required to respect a ceiling on leverage, computed on the basis of non-risk-weighted assets. The ceiling would be used to complement the capital adequacy ratio and would therefore be an insurance against the failure of complex models used to assess credit risk which is the dominant risk in most emerging countries. The non deposit-taking non bank financial institutions in Ghana are regulated with the gearing ratio. They are not to borrow more than ten times their total liabilities. It was argued that because they do not take deposits a cap on liabilities will be more prudent in strengthening and boosting their

solvency. In the same vein, it could be argued that since deposit taking institutions also borrow from the public, it stands to reason that they should also be regulated by the gearing ratio. The argument has even become more relevant now that the deposit-taking financial institutions and the non deposit taking institutions in Ghana are all being governed by the Banking Act in Ghana, 2004 (Act 673) as amended.

Research questions

The crucial mind boggling questions therefore are;

- Should banks be allowed to fail irrespective of the extent of risks they pose to the system when they take bad decisions?
- Would capital charge for systemic risk prevent banks and other financial institutions from becoming systemically important?
- Should non deposit-taking non bank financial institutions be subjected to the CAR framework?
- Would determination and incorporation of a charge for systemic risk make the capital adequacy prescription of Basel II more conservative?
- Why does the CAR framework not directly incorporate the measurement of such an important risk such as the systemic risk?

1.2 PROBLEM DEFINITION

Introduction

Systemic important banks are known to pose systemic risks to financial systems (Persuad & Spratt 2005). Regulators generally hold the view (as demonstrated by the Bank of England, Mervyn King) that banks should not be salvaged when the cause of their problem is due to their own carelessness and gross irresponsibility. The same view is even extended to Deposit Insurance Companies not to salvage institutional investors or high net-worth depositors due to the caveat emptor principle (buyer must be ware) for fear of compromising market discipline or

creating moral hazard. The institutional investors or high net-worth individuals are expected to be more knowledgeable in financial matters and therefore, at least, be expected to observe the "caveat emptor" concept in every transaction they undertake, as against ordinary individual investors. The institutional investors are expected to continue to monitor these transactions to ensure that they obtain the best from their investments. It has been argued that just as regulators would want banks to maintain good capital levels or a very good balance sheet structure, the banks themselves appear more comfortable when their balance sheet is good enough to support their activities. However, most of these managers are swayed by their prime motive of having to make good returns for shareholders. This is found in their high risk appetite. Just as it is generally believed that one cannot at any time eat his cake and have, so it is in the finance world. If your risk appetite is high (in the form of increase in portfolio size, sophistication in products, general complexities of activities etc.) then you must provide for it in the form of higher capital. It has been argued by many including regulators that capital must be proportional and reflective not only of the institution but of the impact of the institution to the system as a whole. Paradoxically however regulators pose a difficult stand of threatening to allow institutions to fail when they take bad decisions. And since it is now becoming evident that this stand of the regulators is more of a bluff especially when the institution wields so much influence to the system, why do we not then find an antidote to the risk associated with the influence such institutions pose to the system.

The Main Problem

Despite this hard line principle and assertion, regulators, though reluctantly, go beyond their statutory safety nets to salvage banks when in their opinion, the banks' insolvency could crash the whole system. It is for this reason that the non identification of systemic risk from the traditional risk factors (credit, market & operational) and lack of clear measurement criteria as well as the absence of a charge for it by both Basel I and II becomes an issue of concern.

Alan Greenspan, the celebrated former chairman of the U.S Federal Reserve Board was noted to have said that "… it would be useful to central banks to be able to measure systemic risk accurately, but its definition is still somewhat unsettled. It is generally believed that systemic risk represents a propensity for some sort of significant financial system disruption" (Delton & Campbell, 2002). Though the study shares the opinion Alan Greenspan on the usefulness of measuring systemic risk, it disagrees with him that its definition is unsettled and also it cannot be accurately measured. The study believes that the definition of systemic risk in the financial world is settled and like this study attempts are being made to accurately measure it. As earlier noted, no matter the form that systemic risk would take, it is a risk that causes havoc not to only one unit but to the whole system.

The various risks drivers or components (credit, market and operational etc.) are interrelated as identified in the Basel II framework. They are believed to produce a synergy which grows exponentially (compared to the traditional risk factors) especially as banks become large and complex and do business across borders. The synergy produced by the various quantifiable risks must be recognised since they go beyond the internal systems and borders and must be measured separately. The volatilities identified and quantified by the Basel II framework are limited to the units of systems and are restricted within countries or geographical locations even though financial intermediation knows no boundaries. Process regulation involving Consolidated Supervision and other risk management practices of the banks as well as the current capital adequacy ratio (CAR) framework do not in themselves capture these relationships much less the associated risk outside the chain or the groups of institutions. It has been advocated by many that markets should now be regulated instead of units or institutions. This is partly the reason why International Accounting Standard (IAS) 30 – Accounting for Banks was withdrawn and replaced by a number of standards including IAS 39, 32 and other International financial reporting standards (IFRSs), to regulate markets and not banks. In view of this if a motor or

an energy company decides to deal in financial instruments such as treasury bills, commercial papers, derivatives etc., the measure for valuing the financial products will not change from measures used to treat similar products on the balance sheet of banks.

Auxiliary Problem

Again Basel II is found to overly recognise securitization (derivative) as having a high rating and, for that matter, a low Probability of Default (PD) irrespective of the nature of asset behind the derivative. Currently the enhancement to the Basel II framework (2009) which was recently issued has sought to make amends has only succeeded in increasing the capital charge for all off-balance sheet items from 20% to 50%. This is good and in the right direction, but this in itself does not fully solve the problem. It has also sought to lift the veil behind derivative products by encouraging banks to know the underlying behind the derivatives. Derivative products are generally considered risky products in finance. Besides, non banks (investment companies) are currently found to trade in complex, sophisticated products and risky products, including securitised assets, yet they are not subjected to stringent regulation including applying the CAR framework with an appropriate charge as a form of capital regulation. It is for this reason that the study is advocating an extension of the CAR framework to non bank financial institutions.

The gaps or a shortcomings of the current (Basel II) CAR framework of not adequately capturing the connectivity of the various risks and not encouraging the "lifting of the veil" behind securitization (derivative products) as well as not separately capturing systemic risk into the framework are the mainstay of my research work.

1.3 EXISTING BODY OF KNOWLEDGE AND GAPS

Exclusion of systemic risk measurement from Basel II

As already noted so much research work has been done on systemic risk and the effect on the financial system, however so far so little has been done on its measurement.

The Capital Adequacy Ratio (CAR) framework of Basel II recognises and quantifies credit risk, market risk and operational risks as a charge to capital, but the framework does not recognize and measure systemic risk.

The closest the Basel II document went in associating with systemic risk is found in the operational risk framework. Basel II defined operational risk as "…the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events." The last phrase in the definition "systems or external events", sounded as though it sought to address the big question of systemic risk. However, in reaction to public outcry over the definition of operational risk, which was considered as lacking clarity and too "omnibus", the committee confirmed in the revised version of the September 2001 Basel Accord that it did not intend the definition to comprehend systemic risk. In other words, systems and external events mentioned in the document had nothing to do with systemic risk. This leaves systemic risk measurement completely out of the Basel framework, though it is highly recognised and mentioned several times in the accord.

To further concretise the confirmation of the non-recognition of systemic risk as part of operational risk, it would be realised that none of the measurement criteria of operational risk, be it Basic Indicator, Standardized or Internal Model or Advance approaches did measure systemic risk of banks or more importantly, establish the relationship with the other risks factors. To this end, it is clear that

the attempt to put some weight on operational risks by the Basel Committee by isolating it from credit risk still leaves unanswered the question of systemic risk.

Capital charge for systemic important banks

Persaud & Spratt 2005 proposed a penalty in the CAR framework to prevent banks from becoming systemically important. Their study however could not establish an objective and scientific framework for the measurement of systemic risk. They only proposed that supervisors should require individual banks deemed to be systemically important to hold additional 1% of the portfolio as capital. It could be argued that even though the advocacy of Persaud and Spratt 2005 for banks deemed to be systemically important to hold additional capital for systemic risk was laudable, their measurement criteria was arbitrary and the 1% charge of the portfolio was without basis as it was not scientifically determined. Besides, systemic important banks may vary in their level of importance, hence a fixed charge by all systemic important banks advocated by Persaud and Spratt, 2005 is not plausible.

Also they did not establish the relationship between systemic risk and the other quantifiable risks. Their research thinking again could be said to connote negativity as it sounded punitive rather than a mechanism for the control of risk.

The Global financial crisis, Systemic risk and Capital adequacy.

The recent global financial crisis which caused a lot of havoc to many nations has taught a lot of lessons to financial industry players, regulators, governments and the public at large. “One important lesson that is learnt from the crisis is that, the traditional approach of assuring the soundness of individual banks needs to be supplemented by a system-wide macro-prudential approach” (Huang, Zhou and Zhu 2010). Also from macro-prudential perspective, supervision should focus on the soundness of the banking system as a whole and the inter-linkages between financial stability and the real economy (Huang, Zhou and Zhu 2010). In view of

this the players in the industry, particularly, the regulators have embarked on a lot of reforms to address in particular systemic risk associated with transactions and businesses in general. The Basel Committee of Banking Supervision (BCBS) in view of the reforms issued out 'Enhancements to the Basel II framework', 2009 to address some of the concerns. The paper proposed that banks using internal ratings-based approach to securitisation are expected to apply higher risk weights to re-securitisation exposures. Re-securitisation in this regard is considered as the process whereby a bank or a financial institution securities products from a pool with products in various tranches including a securitised products. In other words the pool shall include other exposures such as loans, overdrafts, simple investments etc., in addition to securitised products. Also as part of the reforms banks will not be permitted to use ratings for exposures subject to self-guarantees. This is because banks were found to be issuing commercial papers which are securitised by the holders and the banks turn round to guarantee the securities (either in the form liquidity facility or ordinary guarantee) thus artificially influencing the ratings of those securities. This was at best considered as self-induced price hikes and thus frowned on by the new reforms. (Banks and other institutions have over the years been allowed by Securities and Exchange Commissions' (SECs) in various countries to buy back their own shares so as to influences the prices of those shares on the market. This gives the same effect as guaranteeing of Asset-backed Commercial Papers). It is the view of this study that the non permission of banks to influence ratings of exposures through self guarantee should be extended to banks buying back or attempting to buy back their shares to influence prices on the market and sometimes offloading them later to make a gain. This is not only a self-induced price hike but an arbitrage program that could destabilise markets.

Again in view of the crisis banks are expected to undertake their own due diligence and not to simply rely on ratings of credit agencies in conformity with reforms of operational requirement for credit analysis. The reform is considered by this study as very important which will enable banks to use their expertise to

do what they know best (Persaud and Spratt, 2001). However, a more conservative requirement is needed to forestall any practice that may fuel systemic risk. The study therefore believes that in situations where banks and other financial institutions use favourable ratings other than a conservative rating by the rating agencies, they must be made to explain to regulators why they ignored the conservative rating of the rating agencies. Given the chance banks and other financial institutions will be individualistic by doing things that will favour them alone. They will not be too much concerned about the whole system. In view of this the relevance of the rating industry should not be "killed" by allowing banks to solely rely on their expertise and their rating alone. It is also best to have an external check especially in situations when ratings of the rating agencies are less favourable to an institution.

The reforms espoused by the 'Enhancements to the Basel II framework', 2009 also proposed that "the credit conversion factor (CCF) for all eligible liquidity facilities (LFs) in the Standardize Approach securitisation framework will be made uniform at 50%, regardless of the maturity of the liquidity facility". Hitherto existing liquidity facilities under one year receive a 20% credit conversion factor (CCF) in the Standardized Approach, while those over one year receive a 50% CCF. However, all other commitments of securitisation exposures receive 100%.

General charge for systemic risk

Viral .A. Archaya, 2000, tried to capture systemic risk as general risk as per portfolio theorem by likening it to macro economic factors such as interest rate risk, foreign exchange risk or industry risk. He noted that banks will then distinguish between general risk and specific risk when computing CAR, and that specific risk which are bank specific could be diversified away whilst general risk is general for all banks in the system.

Archaya's proposal likens systemic risk to general risk, meaning his proposal did not consider systemic importance of banks. Hence each financial institution shall

be unfairly subjected to a general charge irrespective of the level of sophistication or complexity it assumes in the financial industry.

1.4 PURPOSE OF THE STUDY

Systemic risk has over the years proved to be very devastating in the financial world once it occurred. The Dot.Com crash in the late 1990s, where the stock market became beguiled by internet companies; the Long-term Capital Management crisis popularly called the Asian crisis between 1997 -1999 involving hedged funds; the crash in 1987 where the US stock market suffered their largest fall; the Savings and Loans Scandal and the current US sub-prime debacle and the ensuing financial crisis, only to mention a few, have all caused indelible havoc to the financial system.

It is for this reason that this study has come handy to serve as the basis for the measurement and control of systemic risk by the financial world so as to ultimately help mitigate the potential menace by shifting the responsibility and cost from the central banks, and for that matter the taxpayer, to the commercial banks.

Lessons from systemic financial events:

Dot.Com crisis

The Dot.Com or the Information Technology bubble as noted started between 1995-2000 and was mainly triggered by speculation in the internet and related companies. This resulted in a tremendous rise in the equity values from growth in the internet companies of the industrialised countries. The growth in the internet boom started with the advent of a world-wide web in the early nineteen nineties which made communication in all forms very easy. The seemingly profitable internet services soared up the prices of such companies such that any company with a prefix ".com" or "e" will do well. The speculation got to a crescendo and crumbled in the early two thousands. Some researchers have however argued that the crisis would have happened anyway, because it fell in line with the supposed cyclical booms and busts of the financial markets. Whatever the case the crisis caused havoc to the financial markets.

The Long-term Capital Management crisis which, was lasted for about two to three years. It was a U.S fund which used trading strategies such as fixed income arbitrage, statistical arbitrage, and pairs trading combined with high leverage. It was a large fund ($126 billion in assets) that failed particularly in the late nineteen nineties (1998) leading to massive bailouts by the banks and the other investment companies which were supervised by the Federal Reserve Board (FED) of the United States of America. The Long-term Capital Management Fund was founded in 1994 by the Nobel Prize winners in economic sciences (Merton and Scholes). The fund was initially very successful chalking about 40% annualized returns but lost about $4.6 billion when it was hit by the Russian crisis and therefore had to close down in the early two thousand. Like many hedge funds, its investment strategies were based on a fairly regular range of volatility in foreign currencies and bonds. As noted the fund started having problems when Russia declared it was devaluing its currency and therefore made it difficult for the country to honour its obligations on its bonds. It thus moved beyond the regular range of volatility that the Long-term Capital Management (LTCM) Fund had counted on. This triggered a sharp response leading to a fall in market prices in most markets. For instance the U.S stock market responded with a drop of 20%, while the European stock markets fell by 35%. Investors thus sought refuge in Treasury bonds and hence caused interest rates to drop by over a full point. In view of this, the LTCM's highly leveraged investments began to collapse and hence by the close of August 1998, it had lost about 50% of the value of its capital investments, and since quite a number of banks and pension funds firms which had heavily invested in the LTCM fund, essentially bore the brunt of the problems of the fund which threatened to push them to near bankruptcy. In a bid to save the U.S banking system, the then celebrated chairman of the Federal Reserve Board, Alan Greenspan personally convinced fourteen of the banks to remain invested in the hedge funds to avoid the possible breakdown of the system and the rippling effects that might ensue. In addition the Federal Reserve Board started lowering the Fed Funds rate as a sign of reassurance that it would do everything possible to support the U.S economy and salvage it from collapse. The situation at the time showed that without direct intervention the U.S economy and other economies, be it, developed or emerging would have been seriously

threatened to bankruptcy. (IMF World Economic Outlook 1998; IMF report, 2002; European Central Bank financial stability report, 2006). The paper indicated that there is growing concern that the large role of hedge funds in today's markets could cause a repeat of the threat and uncertainties.

The crisis as noted reinforces the view of the study that financial institutions including banks and non banks must be regulated and be made to accumulate additional reserve based on their systemic importance.

Savings & Loans Crisis

The Savings and Loans (S&Ls) organisations otherwise known as the thrift or Buildings and Loans (B&Ls) organisations have been in the American financial industry since the nineteenth century mainly to help the working class to save towards buying a house in the future. They originally took the form of non profit organisations which were typically managed by members who are also aspiring to be homeowners. They were basically formed on the platform of the broader social reforms efforts of the various states of America and not as part of the financial industry. It originated from the British building society that emerged in the eighteenth century. (R. Whaples, 2003). The concept changed during the industry revolution and the demand for the product soared as a new type of product called "national" Buildings and Loans was ushered unto the market. The "nationals" who were typically profit oriented (mainly formed by bankers and industrialists) managed to change the original concept of the "club". They formed local branches to sell shares to prospective members at rates up to four times higher than those offered by other financial institutions. The depression of 1893 also called the "Panic of 1893" naturally caused a decline in membership of the organization and hence seriously threatened its finances as the "national" was unable to pay both the interest and the principal amounts of shares issued. This led to the first crisis of the Savings and Loans companies when it was then called National Building and Loans. It was after this that some form of regulation was put into the operations of the Buildings and Loans organizations, to make them more uniform and a more formal. In addition a broader trade

association was formed and the name was changed from buildings and loans to savings and loans. (R. Whaples, 2003).

The two decades that followed the second world war in the twentieth century happened to be the most successful periods in the history of the savings and loans industry as the return of millions of servicemen eager to settle down and forget about the ravages of the war led to a dramatic increase in families and this caused a sharp increase in suburban home construction. This led to an unprecedented increase in the profitability and assets of the savings and loans industry.

A very important trend which involved the frequent increasing of rates paid on savings to lure deposits ensued; a practice that resulted in periodic rate wars between thrifts and even commercial banks. These rate wars became so intense that in 1966 the US Congress took the highly unusual move of setting limits on savings rates for both commercial banks and S&Ls. From 1966 to 1979, the enactment of rate controls presented thrifts with a number of unprecedented challenges, chief of which was finding ways to continue to expand in an economy characterized by slow growth, high interest rates and inflation. These conditions, which came to be known as stagflation, caused a serious havoc to savings and loans finances for a number of reasons. For instance, because the regulators controlled the rates the savings and loans organizations could pay the desired interest on savings as they wished. Also as interest rates rose depositors often withdrew their funds and placed them in accounts that earned market rates, (a process known as disintermediation). At the same time, rising rates and a slow growth economy made it difficult for people to qualify for mortgages and this in turn limited the ability to generate income for the organisations and began the cycle of a gradual demise of the savings and loans companies. (R. Whaples, 2003).

As a result of the difficult and complex economic conditions, the savings and loans managers came up with several innovations, such as alternative mortgage instruments and interest-bearing checking accounts, as a way to retain funds and generate lending business. Such actions allowed the industry to continue to record steady asset growth and profitability during the 1970s even though the actual number of thrifts was falling. Despite such growth, there were still clear signs that the industry was rasping under the

constraints of the reforms and regulation. This was especially true with the large S&Ls in the western US that yearned for additional lending powers to ensure continued growth. Despite several efforts to modernize these laws in the 1970s, few substantive changes were enacted. (R. Whaples, 2003).

In the late 1970s, the financial health of the savings and loans industry was again seriously challenged by a return of high interest rates and inflation, which was characterised this time by a doubling of oil prices. Also in an effort to take advantage of the real estate boom (outstanding US mortgage loans: 1976 $700 billion; 1980 $1.2 trillion) and high interest rates of the late 1970s and early 1980s, many Savings and Loans organisations lent far more money than was prudent, and to risky ventures which many Savings and Loans were not qualified to assess, especially regarding commercial real estate. Liar's Poker, Micheal Lewis, 1996. L. William Seidman, former chairman of both the Federal Deposit Insurance Corporation (FDIC) and the Resolution Trust Corporation, stated, "The banking problems of the '80s and '90s came primarily, but not exclusively, from unsound real estate lending."

Another factor was the efforts of the Federal Reserve to wring inflation out of the economy, marked by Paul Volcker's speech of October 6, 1979, with a series of rises in short-term interest rates. This led to a scenario in which increases in the short-term cost of funding were higher than the return on portfolios of mortgage loans, a large proportion of which may have been fixed rate mortgages (a problem that is known as an asset-liability mismatch). Interest rates continued to skyrocket, placing even more pressure on Savings and Loans organisations as the years drew closer to the 1980s and this led to increased focus on high interest-rate transactions. Zvi Bodie, professor of finance and economics at Boston University School of Management, writing in the St. Louis Federal Reserve *Review* wrote, "asset-liability mismatch was a principal cause of the Savings and Loan Crisis". White, Lawrence J. (1991).

Because the sudden nature of these changes threatened to cause hundreds of Savings and Loans failures, Congress finally acted quickly on deregulating the industry. It therefore passed two laws, the Depository Institutions Deregulation and Monetary Control Act of 1980 and the Garn–St. Germain Depository Institutions Act of 1982. The deregulation

not only allowed the savings and loans industry to offer a wider array of savings products, but also significantly expanded their lending authority. These changes were intended to allow Savings and Loans to get over their problems, and as such represented the first time that the government explicitly sought to increase Savings and Loans profits as opposed to promoting housing and homeownership. Other changes in thrift oversight included authorizing the use of more lenient accounting rules to report their financial condition, and the elimination of restrictions on the minimum numbers of Savings and Loans stockholders. Such policies, combined with an overall decline in regulatory oversight (known as forbearance), contributed immensely to the collapse of the Savings and Loans industry. (R. Whaples, 2003).

The deregulation of Savings and Loans industry ushered the industry into the realms of banking and hence gave them many of the capabilities of banks, but the industry was not held with the same regulations as banks. Savings and Loans associations this time round had options; they could either choose to be under a state or a federal charter. Immediately after deregulation of the federally chartered thrifts, state-chartered thrifts rushed to become federally chartered, because of the advantages associated with a federal charter. In response, states in the U.S such as California and Texas changed their regulations so to be similar to federal regulations.

More important, however, was the "moral hazard" of insuring already troubled institutions with public funds. In the view of a Savings and Loan president or manager, the trend line was fatal over the long haul, thus to get liquid, the institution had to take on riskier assets, particularly land. For this reason when the real estate market crashed, it went with the Savings and Loans industry. The concept of "moral hazard" involves creating the very behaviour one seeks to prevent: by insuring the risk, the government guaranteed that desperate Savings and Loans owners and managers would engage in ever more risky investments, knowing that if they were successful, the institution would be saved, and if unsuccessful, their depositors would still be bailed out. It is however the view of the study that moral would not be an issue if the failure of the industry could have systemic effect on the whole financial industry and the economy as a whole.

The study analyses the detailed summary made by Norman Strunk and Fred Case (1988) on the major causes for losses that hurt the savings and loan business in the 1980s as follows:

There was lack of net worth for many institutions as they entered the '80s, and a wholly inadequate net worth regulation. This means that capital regulation was thrown to the background.

There was decline in the effectiveness of regulation in preserving the spread between the cost of money and the rate of return on assets, stemming from inflation and the accompanying increase in market interest rates.

There was absence of an ability to vary the return on assets with increases in the rate of interest required to be paid for deposits.

There was increase in competition on the deposit gathering and mortgage origination sides of the business and with a sudden burst of new technology it made it possible for new ways of conducting financial institutions generally and the mortgage business in particular.

Savings and Loans gained a wide range of new investment powers with the passage of the Depository Institutions Deregulation and Monetary Control Act and the Garn-St. Germain Depository Institutions Act. A number of states also passed legislation that similarly increased investment options. These introduced new risks and speculative opportunities which were difficult to administer. In many instances management lacked the ability or experience to evaluate them, or to administer large volumes of non residential construction loans.

The elimination of regulations initially designed to prevent lending excesses and minimize failures also immensely contributed to the crisis. The regulatory relaxation permitted lending, directly and through participations, in distant loan markets on the promise of high returns. Lenders, however, were not familiar with these distant markets. It also permitted associations to participate extensively in speculative construction activities with builders and developers who had little or no financial stake in the projects.

Fraud and insider transaction abuses were the principal cause for some 20% of savings and loan failures and a greater percentage of the dollar losses borne by the Federal Savings and Loan Insurance Corporation (FSLIC).

A new type and generation of opportunistic savings and loan executives and owners— some of whom operated in a fraudulent manner — whose takeover of many institutions was facilitated by a change in FSLIC rules reducing the minimum number of stockholders of an insured association from 400 to one.

Gross dereliction of duty by the board of directors of some of the savings associations. This permitted management to make uncontrolled use of some new operating authority, while directors failed to control expenses and prohibit obvious conflict of interest situations.

A virtual end of inflation in the American economy, together with overbuilding in multifamily, condominium type residences and in commercial real estate in many cities. In addition, real estate values collapsed in the energy states — Texas, Louisiana, and Oklahoma — particularly due to falling oil prices — and weakness occurred in the mining and agricultural sectors of the economy.

Pressures felt by the management of many associations to restore net worth ratios. Anxious to improve earnings, they departed from their traditional lending practices into credits and markets involving higher risks, but with which they had little experience.

The lack of appropriate, accurate, and effective evaluations of the savings and loan business by public accounting firms, security analysts, and the financial community.

The organizational structure and supervisory laws, adequate for policing and controlling the business in the protected environment of the 1960s and 1970s, resulted in fatal delays and indecision in the examination/supervision process in the 1980s.

The Federal and state examination and supervisory staffs could meet the challenge as they not many, lacked experience, or ability to deal with the new world of savings and loan operations.

The inability or unwillingness of the Bank Board and its legal and supervisory staff to deal with problem institutions in a timely manner. Many institutions, which ultimately closed with big losses, were known problem cases for a year or more. Often, it appeared, political considerations delayed necessary supervisory action.

Lessons from catalogue of systemic events:

A run through the catalogue of systemic events brings forth intriguing revelations. It is clear that most of the events showed that the institutions came out with innovations to meet the fast changing needs of society as dictated by their prevailing circumstances. The events again revealed that the ingenuity of the institutions resulted in the churning out of complex products intertwined with complex processes which either defied the regulatory framework of the time or were not regulated because the products were not effectively comprehended by the regulators. It is again evident that whilst the institutions focused on growing their portfolio, they failed to build up their capital to commensurate with the risk associated with the programs they were undertook. Again, it was obvious that as the institutions became large and complex and became a threat to the system no mechanism was put in place to salvage the system from collapse in case of any eventuality.

1.5 OBJECTIVES OF THE STUDY

The objectives of the study are as follows:

- To ascertain whether systemic risk of financial institutions could be effectively measured
- To come out with a capital adequacy ratio framework to include systemic risk.
- To expand the computation of CAR to non bank (non deposit taking) financial institutions.

1.6 HYPOTHESIS

Two hypotheses have been identified for the study.

The Null Hypothesis (Ho) is as per below:

1 Ho: The impact of systemic risk of financial institutions can be effectively measured.
2 Ho: The framework of capital adequacy ratio of financial institutions should include systemic risk.

The Alternate Hypothesis (Hi) is accordingly stated as follows:

1 Hi: The impact of systemic risk of financial institutions cannot be effectively measured
2 Hi: The framework of capital adequacy ratio of financial institutions should not include systemic risk.

The hypotheses would be tested based on multiple regression analysis using student's t test as test statistic at a confidence level of 95%. The student's t test is considered more appropriate because even though the study will be considering sixty (60) observations the population sample size of banks is less than thirty (30).

1.7 METHODOLOGY

The study will be conducted by employing the following methodology:

Data Collection

The study will consider the banking industry in Ghana as the population and will sample fifteen banks out of the twenty-six banks with respect to the group that the fall in. Also three non bank financial institutions are also chosen out of thirty five institutions. The average annual CAR, of the sample banks, to the Gross Domestic Products (GDP) growth of Ghana will be conducted to see the cyclical relationship.

For primary data, personal structured interviews of two management staff members of each of the selected institutions will be conducted. In addition, two senior members of the Banking Supervision Department of the Bank of Ghana will be interviewed. Again views of the Heads of the risks management departments of the sampled institutions will be obtained through questionnaires.

Secondary data will also be obtained from the audited accounts/annual reports as well as statutory returns of banks submitted to Bank of Ghana. Also data may be gathered from on-site & off-site reports of the Banking Supervision Department of the Bank of Ghana, accredited international, financial and business journals, the Banking Act of Ghana, 2004 (Act 673), Canadian Banking Act, Federal Deposit Insurance Act of the United States of America. Secondary data shall mainly be used to support the primary data obtained.

Data Analysis

A prime systemic risk (S^1) will be derived based on probability and combinational analysis theorem of the three known and quantifiable risk factors. The analysis of the risk factors of Credit Risk (CR), Operational Risk (PR) and Market Risk (MR) will be based on certain assumptions after which the sets theory is used to derive the prime systemic risk (S^1). The theory of synergy, which is the increase in risk due to the interaction of the risk factors, is then used to determine the exponential growth rate of the prime systemic risk (S^1) to obtain systemic risk (S).

Multiple Regression Theory

Having derived systemic risk (S) the analysis of the data will be based on five main identified research variables. These are the Capital Adequacy Charge (CAR) which is the dependent variable (Y) and the independent variables, Credit Risk (x_i), Operation Risk (x_{ii}), Market Risk (x_{iii}), and Systemic Risk (x_{iv}). Multicollinearity of the independent variables shall be considered. Therefore the equation to be estimated is specified as follows:

$$CAR_{it} = c + \beta_1 CR_{it} + \beta_2 MR_{it} + \beta_3 PR_{it} + \beta_4 S_{it} + \varepsilon_{it}$$

Where $\beta_1 = \beta_2 = \beta_3 = \beta_4 \rangle 0$

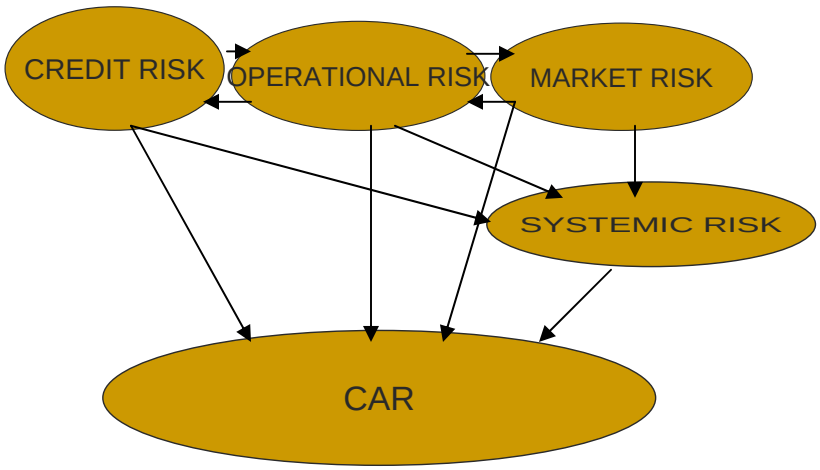
i =1,2,…,n is category of firm i

t =1,2,…, T is time (monthly)

The Multiple Linear Regression Model will be used to establish the relative impact of the independent variables and the dependent variable will be established after which the significant level will be tested. The trend of each institution's CAR framework for the first three years would be used.

The conceptual model used to depict the relationship between the five variables is as per below:

CONCEPTUAL FRAMEWORK



The framework shows that the traditional risk components of credit, operational and market risks interact with each other and together produces a synergy in the form of systemic risk which grows exponentially. The concept of synergy is "…the whole in greater than the sum of the individual parts".

1.8 OUTLINE OF THE CHAPTERS

The research is arranged and presented in five chapters and are made up of the following:

- **The Introductory chapter**

  This chapter discusses the research problem, the aim and objective of the study and its significance. It gives an idea in the form of a brief outline of what the whole subject matter is about and the relevant chapters to be found in the document.

- **The literature review chapter**

  This chapter critically analyses other relevant literature by examining the gaps or shortcomings that exist in them. It also considers areas of other literature the support the study.

- **The research methodology chapter**

  This chapter discusses the study's hypothesis and the analytical technique used to run the tests. It again considers the conceptual framework and methodologies of the study.

- **Data analysis and presentation chapter**

  This chapter deals with the analysis of the research data from which the findings are derived.

- **Summary, findings, conclusions and recommendations chapter**

  This chapter gives a summary of the work done and highlights the main findings, conclusions and recommendations.

CHAPTER TWO

2.0 REVIEW OF RELEVANT LITERATURE

2.1 INTRODUCTION

Risk and risk mitigation are bed fellows as any form of risk will necessarily call for mitigation strategies to curb the risk. Capital charge has been identified in the banking system as one of the most effective ways of financial risk mitigation (BIS 1996). It serves as a means for which financial institutions directly absorb losses and potential losses in their books. Various risk mitigation strategies have been identified, however practically, the 'capital adequacy framework' has been found to be one of the most effective methods of risk absorption in the banking system (BIS 1996).

The traditional risk elements (credit, market and operational risks) have so far been identified and quantified (BIS 1996). Many more risk elements such as reputational risks, systemic risk etc, have also been identified yet no measurement criteria have been set for them. It is for this reason that systemic risk, which some researchers and I consider very vital, is being examined for possible quantification and measurement so that together with the traditional risk elements will result in a comprehensive and potent capital adequacy framework in particular and financial risk mitigation in general (Viral Archaya 2000, Persaud and Spratt 2005).

2.2 LITERATURE REVIEW

2.2.1 SYSTEMIC RISKS IN FINANCIAL SYSTEMS

In recognition of the havoc that systemic risks have caused in the world economy over the years, researchers have widely researched the topic. This notwithstanding, not much progress has been chalked with respect to the measurement and control of the risk. Delton and Campbell 2002, quoted the

celebrated chairman of the US Federal Reserve Board, Alan Greenspan, as follows: "…it would be useful to central banks to be able to measure systemic risk accurately, but its definition is still somewhat unsettled. It is generally believed that systemic risk represents a propensity for some sort of significant financial system disruption"[4]. The definition of systemic risk as already noted is however not in question; Kaufman & Scott, 2002, Bartholomew & Whalen 1995, Mishkin 2007, etc. have all variously defined Systemic risks and have underlined the commonality as risk affecting the whole system irrespective of their individual level of consideration of the subject. What is however unclear is its measurement.

"Most models in banking literature deal with single bank's decision problem and the incentives of different holders of the bank in particular and of owners and managers." (Eichberger & Summer, 2004). The literature captured two sources of systemic risk factors: "an exposure of banks to common risk factors and the transmission of insolvencies through the inter-bank market. The position of Eichberger & Summer, 2004 is corroborated by Persaud & Spratt 2005, who do not only recognize the transmission of systemic risk through the insolvencies in the inter-bank market, but frowns on transferability of risk through diversification in the financial system. In their Alternative Advance Approach paper, Persaud and Spratt 2005 were more focused on the shortcoming of Basel II in terms of the framework being more for the developed countries and not meant for the emerging countries. The concern of non-charge for systemic risk in the capital adequacy framework was peripheral and perhaps explains why no detailed work was done in that regard aside of advocating for a fixed percentage charge of 1% of net-worth as additional capital. Eichberger & Summer, 2004, however held the view that the use of capital adequacy regulation to address systemic risk is ambiguous and that systemic risk might increase as a consequence of imposing capital constraints on banks. They noted that considering the indirect effect of capital adequacy regulation, while capital regime would boost the buffer of

[4] Remarks were made at a conference on 'Risk management and Systemic Risk', Board of Governors, Federal Reserve System NY 1995 at page 7.

individual banks, it may increase the risks of contagious insolvencies in the banking system as a whole. This position contradicts the positions of Persaud & Spratt 2005 and Archaya 2000 who are of the view that a charge for systemic risk is relevant to systemic risk mitigation. Capital adequacy regulation is mainly used by central banks to prevent bank crises ex-ante. (Viral .A. Archaya, 2000). He further stated that: "A regulatory mechanism that is based only on a bank's own risk and ignores the externality of a bank's actions may leave collective risk-shifting incentives unattended, and can, in fact, severely accentuate systemic risk." Persaud & Spratt 2005, like Archarya 2000 agreed that the CAR framework should include systemic risk. They however proposed different measurement methods. Whist Persaud and Spratt, 2005 prescribed a charge for only systemic important banks, Archaya, 2000 proposed a general charge for all banks and even cautioned that a regulatory mechanism which does not take the consolidated position of the system into consideration could heighten the potential of systemic effect.

Again whilst the position of Eichberger & Summer, 2004 could not be supported due mainly to an erroneous assertion that capital adequacy is a non reserve and therefore do not generate any returns to curb systemic risk; Persaud & Spratt 2005, could also not establish a scientific measurement criteria for systemic risk. Besides, Persaud & Spratt 2005 only proposed a charge for "systemic important banks". Viral .A. Archaya, 2000 unlike Persaud and Spratt 2005 did propose a measurement criterion based on Portfolio Theorem such that a general charge is appropriated by all banks. He however did not consider the systemic importance of banks and hence did not make a distinction between the size and levels of complexity of banks. His proposal of a general charge will unfairly put small and simple non-complex banks on the same scale as large and complex banks.

Again none of the researchers who (even agreed that CAR could be a more useful tool for measuring banks' solvency if systemic risk was incorporated) was able to

recognize and establish the relationship or the synergy that exists amongst the various identifiable risks that could contribute to systemic risk.

2.2.2 SYSTEMIC IMPORTANT BANKS

Systemic important banks are banks that are identified through transparent set of objectives, such as size of market, inter-bank exposure etc. Persaud & Spratt, 2005. They are banks that are considered "too-big-to-fail" since their failure may hurt the economy or the financial system of which they are a part. "Central banks and other likeminded entities spend considerable time and resources trying to reduce systemic risk, the chance that disruptions in one financial market or failure of a large, important financial institution will spill over to other institutions. In contrast to the Federal Reserve's very public efforts to fight inflation, for example, these risk-mitigation efforts typically go unnoticed by the public at large" (Stern & Feldman, 2006). As part of their responsibilities, central banks render Lender of Last Resort (LOLR) service to banks in crisis. Delton & Campbell 2002, who likened "Lender of Last Resort" responsibility of a central bank to Emergency Liquidity Funding (ELF), noted that such a financial service should only be rendered firstly to banks that are illiquid and not insolvent. Secondly, the loan or other financing should be subject to a penalty rate of interest. Thirdly, collateral or security should be provided[5] and last but not least, its use must be discretionary and there should be no expectation that such help would be available. This position is corroborated by Sir Edward George, 1994, who basically was of the view that it is not the business of central banks to salvage banks in crisis. Mishkin, 2007, another strong advocate of the above sentiments, noted that financial market participants who make bad decisions by lending to unsound institutions with little capital should not be rescued.

[5] The theory should be on the basis of market rather than book value which at least for loan assets will typically be inflated, but in reality this will often not be possible and book value will have to suffice.

However despite all the non-rescue positions advocated, of which the position of Governor Mervyn King is no exception, he (Mervyn King) made "… a policy U-turn, a step change by his previous tough stance on lenders who had lost out from relying on cheap debt over the last few years to aggressively grow their businesses." (Robert Peston, BBC Business Editor, 2007). Robert Peston, again noted that the "…Bank of England's offer of £20 billion for banks to borrow was to cover shortfalls in their reserves, rather than to bail out lenders who had allowed themselves to get burned by the fall out in the US sub-prime meltdown."

These positions however sound more theoretical than practical. If the exposition of Governor Mervyn King (current Governor of Bank of England) that Northern Rock Bank had made bad loans and for that matter had been reckless in its operations (BBC News, 2007) is anything to go by and which, of course, is in consonance with positions held by Delton and Campbell 2002, Mishkin, 2007 and Sir Edward George[6], no attempt should have been made to salvage Northern Rock bank. This is because it was obvious that Northern Rock financed the bulk of its long-term investments from volatile inter-bank funds. (Robert Peston, BBC Business Editor, 2007). Indeed, the US under President George W Bush set a $700 billion stimulus package plan from the tax payers funds to rescue financial institutions in the heat of the crisis (i.e. after the collapse of Lehman Brothers). The policy is being vigorously followed by President Obama, the successor of President Bush. Delton and Campbell 2002, noted that "In theory when a bank is illiquid prior to, or as a result of, depositor run, the bank is not necessarily insolvent on a book basis, since it may simply be experiencing a short term inability to liquidate long-term assets to pay short-term liabilities. This produces an asset liability mismatch. In practice, however, experience shows that it is rare indeed to find a bank that is experiencing a run that is not subsequently found to be insolvent".

[6] Previous Governor of the Bank of England.

It follows from the above that the general positions of the Governors, especially, the English Governors and the Federal Reserve System Board member, Mishkin, not to salvage banks in crisis is not tenable since systemic important banks must be salvage irrespective of bad decisions taken by such banks. Again the decisions to salvage banks are based more on the havoc they could cause to the system than the 'Liquidity-Insolvency Theorem' propounded by Delton & Campbell 2002, and Mishkin, 2007. It is thus not surprising that at the peak of the crisis in 2008, the hardest hit nations, the U.S and the U.K as well as most European countries salvaged most of the banks through tax payers' funds. The proposal of creating an international fund among the banks (BBC news 2008) was also a development recognizing the systemic importance of some banks.

2.2.3 CAPITAL CHARGE AND SYSTEMIC RISK

Capital adequacy is seen as an instrument which reduces moral hazard of bank owners arising from difficulties depositors face controlling the investment policies of banks (Freixas and Rochet, 1997). Capital adequacy ratio (CAR) is primarily instituted to ensure that risks associated with depositors' funds are mitigated. "When a financial institution is forced to have a large amount of equity capital, it has more to lose if it fails and is thus less likely to engage in risky activities. In addition, equity capital itself reduces the probability of failure because it provides a cushion to withstand adverse effects on the institutions balance sheet." (Mishkin, 1999). Enhanced or relatively big bank capital has however been found to reduce liquidity creation by banks, even though it enables the banks to survive more often and avoid distress. (Diamond and Rajan, 1999). Eichberger & Summer, 2004 considers capital adequacy regulation as an instrument limiting excessive risk taking of bank owners with limited liability and, thus promoting optimal risk sharing between bank owners and depositors. They went further to state that it is often viewed as a buffer against insolvency crisis, limiting the costs of financial distress by reducing the probability of

insolvency of banks. They however noted that the mechanism linking capital adequacy and systemic risk is unexplained.

In trying to explain the relationship, the model of Eichberger & Summer, 2004 captured two sources of risk, an exposure of banks to common risk factors and the transmission of insolvencies via the inter-bank market. Introducing the capital adequacy framework to their model they realized and eventually concluded that the capital adequacy framework was not clear cut. They also noted that whilst capital adequacy regime may boost the individual regimes of banks, it may increase the risk of contagious insolvencies in the banking system as a whole. Eichberger & Summer saw capital adequacy as a constraint which limits the amount of capital invested in a particular asset and that the CAR model does not specify an alternative investment. Besides, it is neither a reserve requirement nor a buffer guaranteeing how the bank can satisfy its creditors from the returns on its equity. The literature again noted that the degree of protection achieved with capital adequacy constraint depends crucially on the returns which banks can earn on other investments. It asserted that returns on other assets will be affected by the investment decisions of banks in response to a binding capital adequacy constraint and that systemic effects of such returns of other assets are often neglected, when the effectiveness of regulation is assessed. Then again the literature noted that from the model that if capital adequacy rate is increased the inter-bank rate will fall and lower inter-bank rates will induce unconstrained banks to increase loans to their firms hence capital adequacy regulation may increase rather than decrease systemic risk in the banking system.

The position of Eichberger & Summer sounds so simplistic and conjectural to reflect the reality. In the first place one of the assumptions of the model is for customers of banks to have opportunity cost of not investing or undertaking a project to be zero. This assumption is too restrictive since in reality opportunities of firms are likely to depend on the loan conditions that other banks offer. The study was again based on the premise that each firm group finances its projects

from one bank. This again appears too restrictive. Also the presumption that for capital adequacy to be effective it must have qualities of a reserve does not hold. Capital as a component of the Capital Adequacy Ratio is an adjusted capital involving stated capital plus primary reserves and portions of secondary reserves which are eligible for capital (Bank for International Settlements, 2006). This is usually an unencumbered portion of a bank's capital which is net of expected and unexpected losses which will always be available to cushion the bank in times of crisis. The investment of these "reserves" is in the bank (as recorded on their balance sheet) for which risk are measured and charged.

Viral .V. Acharya 2000 held a contrary position to Eichberger & Summer, 2004. He did outline two important mechanisms that central banks should use to curb systemic risk, namely, a capital adequacy to prevent crisis ex-ante and a rescue policy to manage the crisis ex-post. He is of the view that in addition to other risk management practices such as ceilings on deposits, restrictions on branching and scope of banking activities, regulation of the nature of competition amongst banks and between banks and other financial institutions etc, was crucial, so as to ensure the safety and soundness of the financial sector. He also supported the view that financial regulation should ensure financial stability of the system as whole and not individual institutions. He however conceded that the efficacy of the central issue with the different proposals that have been made to improve bank regulation has not been examined under a common theoretical framework that formalizes the objective.

He asserted that even in a single-bank setting, design of capital adequacy regulation that does not incorporate the effective rescue policies, fails to respond to the exact level of risk-taking. Thus Optimal capital adequacy, the goal of which is to mitigate the excessive risk-taking, should be tied to design of a rescue package.

He explained that optimal capital is tied to the correlation of portfolios held by different banks and optimal rescue policies include bank sales upon individual bank failures with little forbearance upon joint failure. Further harping on the shortcoming of 'Myopic' Capital Adequacy framework being used currently, he noted that it only serves as a function only of its own risk and does not penalize the banks for holding portfolios that are highly correlated. Thus whilst individual banks thus practice risk shifting at their level, there is a systematic risk shifting at the collective level. Like Viral Achaya 2000, Huang, Zhou, Zhu, 2009 supported capital adequacy regulation and its efficacy in addressing systemic risk. They however noted that for it to be effective, the framework should be forward looking and should not be based on historical data.

Viral .V. Acharya 2000 supported the view that systemic risk must be measured and tried to apply portfolio theory to estimate beta representing "general" risk with some loading and an "idiosyncratic" component and that the general risk factor could be thought of as a macroeconomic factor such as interest rate risk, foreign exchange risk or industry risk. Hence for a given level of risk prudential regulation would encourage banks to take idiosyncratic or specific risks over general risks. Capital adequacy charge shall therefore include general and specific risks.

Though the position of Viral .V. Acharya 2000, Persaud & Spratt 2004, support the view that capital adequacy should be an important source in curbing systemic risk and should be included in the capital adequacy charge, they however disagreed on its measurement. They both support the argument that the Basel (Basel I & II) have not appropriately measured the inter-bank correlation effect of the banking system and that it stopped short at individual inter-bank transactions.

Viral Achaya 2000 advocated a fixed charge for systemic but did not consider relating risk to the systemic importance of banks. It again failed to establish how beta and the general systemic risk of the framework should be calculated aside of

suggesting the usage of the "Portfolio Theorem". Again, the fact that the literature suggested another framework for the computation of systemic risk for derivative regimes in itself is a serious short coming of the framework since derivatives cannot be alienated from the banking books of the financial system.

2.2.4 CAPITAL ADEQUACY AND SYSTEMIC RISK IN GHANA

Capital adequacy is one of the quantitative mechanisms by which banks' solvency are measured. As clearly articulated in the US Deposit Insurance Supervisory Manual, uniform regulatory capital requirements may reduce systemic risk if credible enforcements introduce measures of confidence in the solvency of financial counterparties. " Capital provides a measure of assurance to the public that an institution will continue to provide financial services even when losses have been incurred, thereby helping to maintain confidence in the banking system and minimize liquidity concerns"[7].

Though the capital adequacy framework is exclusively used for banks and other deposit-taking non bank financial institutions in Ghana it is becoming increasingly clear that other financial institutions, especially, non deposit-taking non-bank financial institutions (NBFIs), are obtaining deposits from the public and generally trading in 'sophisticated' products. The activities of these institutions could therefore escalate systemic risk. Trading in commercial papers, repurchase agreements, credit derivatives by insurance companies, are but a few of the sophisticated products that some NBFIs are trading in. It is mainly for this reason that the new non bank financial institutions law in Ghana, Act 774, purports to migrate both the Savings and Loans companies (deposit taking NBFIs) and Finance Houses (non deposit taking NBFIs) to the banking Act (2001) , Act 673. This way, stricter measures including the stringent capital adequacy framework will be used to measure the said institutions. "While systemic risk

[7] February 2000. See Capital, Section 2.1, available at www.fdic.gov/regulations/safety/manual/99CAPITA_main.htm.

historically has been almost exclusively the concern of central bankers and banking regulatory agencies, modern financial engineering technology and the increasing use of wholesale risk-sharing markets by non-bank institutions mandate a more inclusive approach toward financial stability assessment. An erosion of confidence in a key non-bank financial intermediary or corporation could have significant consequences for systemic risk". (Kupiec and Nickerson 2001)[8].

Some researchers including Eichberger & Summer, 2004 consider capital regulation as no panacea of systemic. Indeed they considered that capital adequacy is very unnecessary in the control of systemic risk. (Kupiec and Nickerson 2001) who however have a contrary view are of the view that much as capital adequacy is essential to systemic risk mitigation, capital regulation alone cannot especially mitigate systemic risk arising from information asymmetry. Kashyap and Stein 2004 noted that "as with any form of regulation, the case of regulating bank capital presumably rests on the sort of market failure, or externality". The externalities in this regard are the systemic cost of bank failures that are borne by the whole system and not the bank in question alone. Kupiec and Nickerson 2001 noted that "it is demonstrated that a pre-commitment approach for minimum capital regulation can remove systemic risks by creating a credible signalling mechanism that removes the moral hazard issues that limited financial contract trading". Kashyap and Stein 2004, who are pro capital adequacy in mitigating systemic risk noted that "… the Basel II approach of having a single time-invariant risk curve – that maps credit risk measures (such as PD) into capital charges-is in general, suboptimal. From the perspective of a social planner who cares not just about bank defaults per se, but also about the efficiency of bank lending, it is more desirable to have a family of curves, with the capital charge for any given degree of credit-risk exposure being reduced when economy-wide bank capital is scarce relative to lending opportunities", (as could be seen in a recession). They noted that the regulators task is to internalise the

[8] Assessing systemic risk under alternative approaches of capital

externalities or the systemic costs through capital regulation. They however espoused the usage of positive NPV loan to internalise such externalities, such that the inefficiencies of bank lending shall be taken care of. Again capital adequacy should not be based on a single curve but series of curves to shift or adjust with booms and recessions. These views have been shared by Persaud and Spratt 2004, who did not only advocate the charge for systemic risk under the capital adequacy framework, but noted that it should be based on systemic importance of banks. Though Viral A Archaya 2001 also advocates a charge for systemic risk under the capital adequacy framework, he however based his theory on an appropriation of general charge based on Portfolio Theorem and therefore did not consider systemic importance of banks which is very crucial. On the other hand, whilst Persaud and Spratt 2004 considered the impact of systemic importance of banks on their proposed framework, they did not come out with a scientific measure but proposed a fixed percentage of one (1%) of the portfolio as additional networth..

Huang, Zhou & Zhu 2009, though advocates a capital charge; believe the charge should be forward-looking. The charge should be based on historical data of financial institutions but on their risk appetite. Their thinking is consonance with the Internal Capital Adequacy Assessment Process (ICAAP) of Basel II. Laudable as this may seem it is based on the institutions own internal processes under pillar 2 and may not constitute a charge under the capital adequacy framework as this is more discretionary which could easily be manipulated to suit the user.

2.2.5 INSOLVENT BANKS, SAFETY NETS AND SYSTEMIC RISK

One of the functions or legal provisions that commercial banks used to lean on to demand support or central banks depend on to assists commercial banks in distress is the function of Lender of Last Resort (LOLR). It is generally believed that it is the last resort which central banks use to curb systemic risk in the

banking system. Safety nets are however considered hazardous to the financial system by some researchers.

"A widely debated issue is whether crisis management should include lender-of-last-resort, be it in the form of macroeconomic monetary policy ("lender to the market") or in the form of microeconomic emergency liquidity assistance ("lending to individual banks")." (De Brant and Hartmann, 2000). The position of lender-of-last-resort is gradually being revoked, if not revoked, from the legal framework of the financial systems of most countries. The major function that banks currently invoke for intervention during bank crisis is the promotion and maintenance of sound and efficient financial system[9]. Among the functions of the Bank of Ghana for instance is to "regulate, supervise and direct the banking and credit system and ensure the smooth operation of the financial system[10].

To confirm current thoughts of central bankers, Sir Gordon George, 1994, the former Governor of the Bank of England, noted that the term LOLR can be confusing and stated that "the role of the central bank is not to prevent each and every bank from failing and that it is necessary for the maintenance of the health of the banking system that there is a possibility of failure."[11]

Delston and Campbel 2002, refers to LOLR as Emergency Liquidity Funding (ELF) in order to better describe what banks have latterly sought to do. In line with the thinking of central banks Delston and Campbel 2002, have established fundamental principles that should generally govern the release of Emergency Liquidity Fund (ELF) to banks in distress. First ELF should be given by a central bank only to banks which are illiquid and not insolvent. Second, the loan or other financing should be subject to a penalty rate of interest. Third, collateral should be provided and Last but not least, its use must be discretionary and there should be no expectation that such help will be available. The practice is common in many

[9] Reserve Bank of New Zealand amendment Act of 1999
[10] Bank of Ghana Act, 2002, Act 612
[11] E. George 'The Pursuit of Financial Stability' in (1994) Bank of England Quarterly Bulletin at page 63

countries; whilst some have stated it explicitly in their statute books, others have it in their Memoranda of Understanding and regulations (Delston and Campbell, 2005). Mishkin, 2007 also supported the positions of Delston and Campbell, 2005 by stating that the understanding of the sources of systemic risk …suggests three general principles for operating as an effective LOLR: (1) restore confidence in the financial system by quickly providing liquidity, (2) limit moral hazard by encouraging adequate prudential supervision, and (3) act as lender of last resort infrequently.

Despite the view of most central banks not to salvage banks which are insolvent, in order not create moral hazards, attempts have always been made to salvage insolvent banks for fear of causing systemic risk in the financial system. Is this because some banks are "too-big-to-fail" and would the central banks that go to the rescue of such distressed banks be perpetuating an illegality? Though Mervyn King, the current Governor of the Bank of England was strongly against funding Northern Rock Bank and even had a row with the Financial Services Authority over the issue[12], he eventually yielded due to the estimated havoc that might result if steps were not taken to prevent the knock down effect that it might have on the financial system.

In recognition of the problems and questions raised Delston and Campbell concluded their paper as follows: "The rules for Providing Emergency Liquidity Funding should be revisited, and the tilt toward providing financing for every bank experiencing a run addressed. At the same time, there should be sufficient flexibility in the law to allow a central bank to provide Emergency Liquidity Funding, on an unsecured basis when needed in a banking crisis. Central banks will do so regardless of rules, therefore the law should reflect the practical realities. In the case of banking crisis, as provided in the model law, consideration should be given to having the state liable for Emergency Liquidity Funding since the health of an essential part of the economy is at stake".

[12] BBC News 20th September 2007

The literature of Delston and Campbel 2005 therefore supports the argument that due to the importance of systemic risk, it must be given special attention and laws that may tie the hands of central bankers to release emergency liquidity funding should be relaxed. Again funds to help distress banks and other financial institutions must be released with minimum conditions, if not without conditions. It is still believed that more empirical research is needed about the actual importance and character of bank contagion. However, the agenda is not likely to be easily fulfilled due to the presence of safety nets in many countries. (De Brandt and Hartmann, 2000).

2.2.6 SYSTEMIC RISK AND OTHER PILLARS (P 2&3) OF THE BASEL II ACCORD

The Basel Accord of the Basel Committee of Banking Supervision (BCBS) after the first publication in 1988 had seen revisions in June1999, January 2001and April 2003 after extensive consultative process was set in place in all member countries and proposals were circulated to supervisory authorities worldwide (Comprehensive version: June 2006). The literature claimed that in developing the revised framework, the committee sought to arrive at a more risk- sensitive capital requirements that are conceptually sound. For this reason in addition to Pillar one of the accord which is devoted to capital regulation, two additional pillars, that is, Pillar 2 and Pillar 3 have evolved in the Basel II framework. Pillar 2 is mainly concerned with supervisory review process, whilst Pillar 3 is concerned with market discipline. The two additional pillars which evolved lately are mainly concerned with risk management practices to be embarked on by the various entities to mitigate risk. Pillar 1 which constitutes a capital regulation involving a charge for the various quantifiable risk factors (Credit, Operational and Market) to cushion financial institutions from risk did not consider systemic risk (BIS, 1996). It is the view of the framers of the accord that the other pillars

will adequately tackle the shortcomings of Pillar I including lack of appreciation of systemic risk.

Pillar 2 which is mainly on the Supervisory Review Process involving regulation of the financial institutions prescribes, among others, the concept of "Internal Capital Adequacy Assessment Process". ICAAP means a bank's own internal process for determining whether capital is adequate. The fundamental objectives of an ICAAP are: identifying and measuring material risks; setting and assessing internal capital adequacy goals that relate directly to risk; and, ensuring the integrity of internal capital adequacy assessments.

Capital must meet or exceed regulatory minimum requirements, regardless of ICAAP results. (Sandra L Thompson, 2008)[13]. The view of Sandra Thompson is shared by many including Persaud & Spratt 2004, Kyshap & Stein 2004 and Viral Archaya 2000 who are of the view that the Pillar 1 framework should incorporate systemic risk. The ICAAP though forward-looking and future oriented (Huang, Zhou & Zhu, 2009) are limited to the institutions risk appetite. Since ICAAP is internal and is largely subjective, it may not be as effective as a mandatory capital requirement under Pillar 1. Also it still does not consider the interactions of the risk factors which together constitute systemic risk.

Again, leaving institutions to establish the materiality of the risk associated to their operations may lead to the understatement of risks, including, systemic risk.

2.2.7 SYSTEMIC RISK AND EMERGING MARKETS

The financial systems of emerging countries are noted to face more potential shocks than the developed economies. (Mishkin, 1999). He noted that "…because emerging-market countries are often primary goods producers, they

[13] Memo of Sandra L Thompson, Director Division of Supervision and Consumer Protection titled "Final Guidance: Supervisory review process of Capital Adequacy (Pillar 2) Related to the implementation of the Basel II Advance Capital Framework.

are frequently subject to large terms of term-of-trade shocks that can devastate banks' balance sheets whose assets are composed primarily of loans to domestic firms." He again noted that "the lack of asset diversification outside their country can thus be a severe problem for banks in emerging-market countries that is not present for many banking institutions in industrialized countries which do not have the ability to diversify their assets across countries."

He again noted that banks in emerging countries usually raise funds with liabilities denominated in foreign currencies. Thus, a depreciation or devaluation of domestic currency can lead to increased indebtedness, while the values of banks' assets have not risen. This could lead to a deterioration of the banks' capital requirements of their respective countries.

Mishkin, 1999 however failed to recognized that it is again true that non diversification of the bank's products could also decouple them from the world economy and therefore be shielded from global shocks as espoused in De Brandt 2000. He noted that the structure of banks, the interconnection of financial institutions through direct exposures and settlement systems as well as information intensity of financial contracts and related problems are the key concerns to systemic risk. A case in point is the sub-prime debacle which has had little effect on emerging countries because they are almost closed economies to the global market. For instance, Donald Kaberuka, 2009[14] is of the view that Africa and for that matter, emerging markets limited integration into the global markets provided protection from direct financial crisis and this is not the consequence of its real economy

The effect of bank failure depends on the nature of the financial system[15]. Archaya, 2001 noted that a bank's failure results in two conflicting effects on other banks. First, there is a reduction in the aggregate supply of deposits and

[14] This is a speech delivered by Dr Donald Kaberuka, President of the African Development Bank on 12 May 2009 in Dakar, Senegal, during an ADB meeting.
[15] The degree of sophistication or interdependence or inter-connectivity of the financial system.

hence, in aggregate investment in the economy. This he noted results in a recessionary spill-over (negative externality) to the surviving banks through an increase in the market-clearing for deposits, thus reducing the profitability of banks. Second, the surviving banks have a strategic benefit (positive externality) from the failure of other banks due to an increase in scale or expansion, resulting from the migration of deposits from the failed banks to the surviving banks. This may also be the lowered cost of operations resulting from the acquisition of the failed bank lending facilities. It is for this reason that private capital rather seems to be moving from the developed economies to emerging economies in the midst of the credit crunch. The foregoing suggests that though the collapse of banks in the emerging markets may not affect the financial system, a collapse of banks in the developed world may only affect emerging economies when their balance sheets are closely interconnected to the developed world.

2.2.8 SYSTEMIC RISK AND ASYMETRIC INFORMATION

Systemic risk is mostly fuelled by perception and perception thrives when the full facts are not well known to the public. Adequate information is therefore vital for the public to express confidence in any institution or system. Mishkin, 1999 noted that "…a crucial impediment to the efficient functioning of the financial system is asymmetric information". He defined asymmetric information as "…a situation in which one party to a financial contract has much less accurate information than the other party". "Regarding the assessment of various systemic events, the information intensity of financial contracts underlines the importance of the distribution of information among the agents acting in the financial sector. General uncertainty and agents' awareness of potential asymmetries of information highlight the role that expectations can play for the occurrence or … non occurrence of systemic events." De Brandt and Hartmann, 2000. They further noted that systemic events driven by expectations might be individually rational but not socially optimal.

Cass and Shell, 1983 noted three potential causes of systemic events related to asymmetric information and expectations as follows:

- That there should be a full revelation of new information about the health of financial institutions to the public;
- That the release of "noisy signal" about the health of financial institutions to the public; and
- That the occurrence of a signal which co-ordinates the expectations of the public without being related to the health of the institutions.

Mishkin, 1999, however noted that asymmetric information leads to two basic problems in the financial system: adverse selection and moral hazard. He defined as …"an asymmetric information problem that occurs before the transaction occurs when potential bad credit risk is the one that most actively seek out a loan. Thus the parties who are most likely to produce an undesirable (adverse) outcome are most likely to be selected. He noted that unlike adverse selection "moral hazard occurs after the transaction has taken place because the lender is subjected to the hazard that the borrower has incentives to engage in activities that are undesirable from the lender's point of view-that is, activities that make it less likely that the loan will be paid back." He noted that asymmetric information could lead to suboptimal investments which could severely affect the financial system.

2.2.9 CAPITAL ADEQUACY AND ECONOMIC CYCLICALITY

Banks' Capital Adequacy Ratio (CAR) has been found to vary with economic seasons of most economies. Economic volatility and systemic risk are also found to have "egg and chicken relation"[16]. Wong, Choi and Fong, 2005, who happen to be an advocate of a pro-cyclical/CAR relationship stated that "…banks tend to hold a higher CAR in economic downturns, but a lower capital ratio in upturns. "

[16] Meaning either systemic risk could fuel economic volatility or vice versa.

They noted that economic cycles may affect the level of CAR, as capital holdings may change over time to accommodate fluctuations in risk arising from variations in the economic environment. These risks may not be captured by the fixed weights attached by the regulator to the assets. This position is supported by other researchers such as Kashyap and Stein 2004.

(BIS,1999) concedes that there is some evidence, in specific instances, that bank lending is constrained by capital requirements, however, the overall macroeconomic impact appears limited. They are however of the view that these constraints would have happened even in the absence of the Basel Accord and, for that matter, CAR. (Catarineu-Rabel, Jackson and Tsomocos, 2003) tried to break the effects of the Basel/CAR on economic cycles into Basel I and II. They argued that the effect of Basel I on economic cycles "...is likely to be muted because earnings are the first against the need to raise provisions or write off loans". On the other hand, they noted that "…the potential for cyclical effects on bank capital appears to be much greater under Basel II. (Kashyap and Stein, 2004) noted "The new capital standards will exacerbate business cycle fluctuations." They stated that in a downturn, a bank's capital base is likely to be eroded by loan losses, its existing (non-defaulted) borrowers will be downgraded by the relevant credit-risk models coupled with general agency cost (due to economic difficulties) may force a bank to hold more capital against its current loan portfolio. They further asserted that "…to the extent that it is difficult or costly for the bank to raise fresh external capital in bad times, it will be forced to cut back on its lending activity, thereby contributing to the initial downturn."

The foregoing suggests that banks would require so much capital in economic downturns; however how much is needed is subject to individual estimation. It is for this reason that banks should stand prepared to hold funds to enable them be on their feet during downturns and where this is regulated all banks and financial institutions shall maintain appropriate capital levels in readiness for the downturn and thus curb systemic risk.

2.3 HIGHLIGHTS OF THE BANKING SYSTEM IN GHANA

2.3.1 EVOLUTION OF THE BANKING SYSTEM IN GHANA

The banking system of Ghana has moved from barter system to monetisation of gold and coins in British colonies in West Africa in the nineteenth century (Edward Ayensu, 2007)[17]. The West African Currency Board served as mini central bank whose responsibility was to issue currency to the four British colonies of Nigeria, Gold Coast, Sierra Leone and the Gambia. "Formal banking was nonexistent in the Gold Coast until 1890. Before then the colonial administration had established an experimental savings bank as a unit within the Department of Posts and Telecommunications". Banking in this regime was to do with the issue of currency as a medium of exchange and mobilisation of basic small private savings. Just around the time three of the 'big five' British banks- Lloyds, National Westminister and the National provincial bank , together with the Standard Bank of South Africa founded the Bank of British West Africa in May 1894 which form the basis of real banking system in Ghana. (Edward Ayensu, 2007).

The post independence era of Ghana still saw a banking system at a rudimentary level which was dominated by public ownership and characterised by extensive government intervention of policies (Brownbridge and Gockel, 1997). This regime saw the control of interest rates by the Bank of Ghana and a number of policy measure geared towards the direct allocation of assets to specific sectors. Policies were motivated by three objectives:

- To raise the level of investments;
- To change the sectoral pattern;
- To keep interest rates both low and stable (Gockel, 1995)

These interventions eventually led to the channelling of resources into irrational ventures culminating in huge non-performing (NPLs) assets in the books of banks

[17]A book used by the Bank of Ghana in commemoration of its Golden Jubilee.

averaging around 41% in the late seventies and early eighties (World Bank, 1994).

To prevent the collapse of the economy and the banking system, the government embarked on an Economic Recovery Program (ERP)[18], including a Structural Adjustment Programme (SAP)[19] and a Financial Sector Adjustment Program (FINSAP)[20] to salvage the economy of the country and the financial sector in particular (Ayensu, 2009).

The banking system in Ghana in contemporary times has moved from the issue of currencies and ordinary savings and loans. It has assumed a relatively complex structure due mainly to privatisation, liberalisation, and globalisation of the economy. Cross-border activities have since intensified. Sophisticated products such as derivatives and securitisation have moved unto the Ghanaian markets though still be at a rudimentary level when compared to banking in the developed economies. Even though it is the wish that every economy will develop it is dangerous if the growth is not matched in improvement in regulation and control mechanisms. The relatively low intermediation of the Ghanaian financial markets could be said to have served as a cushion from the direct devastation of the global credit crunch (Paul Acquah, 2009)[21].

2.3.2 STRUCTURE OF THE BANKING SYSTEM IN GHANA

The Ghanaian banking system has the Bank of Ghana (the central bank) at the Apex with 27 commercial banks (including an apex bank for the rural banks) and

[18] This was implemented in 1983. It was an economic stabilization programme drawn up by the PNDC government and the IMF to arrest an unprecedented economic decline in the country during the 1970s.
[19] This was implemented in mid 1986 to free the economy from dominance from public and state enterprises through restructuring of the regulatory and institutional framework for effective implementation of liberal monetary and exchange rate policies and restructuring of the money and foreign exchange markets.
[20] This was implemented in 1988. It was meant to enhance the soundness of the banking system through an improved regulatory and supervisory framework; to restructure and institute reforms in the operations of financially distressed banks and to improve the mobilization and allocation of financial resources, including the development of the money and capital markets.
[21] A speech read by the Governor of the Bank of Ghana at Institute of Chartered Accounts (Ghana) conference held in Takoradi, Ghana from 27th to 28th May 2009.

128 rural banks. (Trends and Progress, 2008)[22]. There are also 40 Non Bank Financial Institutions. The Bank of Ghana oversees the Banking and Credit system as conferred on it by the constitution of Ghana (Section 183(c) of the 1992 constitution)[23]. As defined by the Bank of Ghana Act, 2000 (Act, 612), the functions of the Bank of Ghana as follows:

- Formulate and implement monetary policy aimed at achieving the objects of the Bank;
- Promote by monetary measures the stabilization of the value of the currency within and outside Ghana;
- Institute measures which are likely to have a favourable effect on the balance of payments, the state of public finances and the general development of the national economy;
- Regulate, supervise and direct the banking and credit system and ensure the smooth operation of the financial sector;
- Promote, regulate and supervise payment and settlement systems;
- Issue and redeem the notes and coins;
- Ensure effective maintenance and management of Ghana's external financial services;
- License, regulate, promote and supervise non-banking financial institutions
- Act as banker and financial adviser to the Government;
- Promote and maintain relations with international banking and financial institutions and subject to the constitution or any other relevant enactment, implement international monetary agreement;
- Do all other things that are incidental or conducive to the efficient performance of its functions under this Act and any other enactment.

[22] A publication made by the Banking Supervision Department of the Bank of Ghana.
[23] "The Bank of Ghana shall encourage and promote economic development and efficient utilization of resources of Ghana through the effective and efficient operation of a banking and credit system in Ghana".

Banks in Ghana until 2004 were structured as Commercial banks, Development banks and Merchant banks. The new banking Act, 2004 (Act, 673) however broke down the barriers and came out with a universal banking licence to engage in specified banking activities involving commercial, development and merchant banking activities, but excluding insurance and capital market activities. Quite recently also, a new Non Bank Financial Institutions Act, 2008 (Act, 774) has migrated the savings and Loans Companies (14) and Finance Houses (20) to be governed by the Banking Act, 2004 (Act,673). The banking amendment Act, 2007 (Act, 738) was also enacted mainly to make way for offshore banking activities into the Ghanaian banking system.

2.3.3 SUPERVISION AND REGULATION OF THE BANKS IN GHANA

The Bank of Ghana regulates the banking system through the banking Act, 2004 (Act, 673), the Banking Amendment Act 2007 (Act 738), the Foreign Exchange Act, 2006 (Act, 723), the Payment Systems Act, 2006 (Act, 559) as well as Directives, Regulations, Guidelines and Business Rules derived from the various Acts.

The Banking Supervision Department (BSD) of the Bank of Ghana which is directly responsible for the supervision of banks and non banks in Ghana conducts and on-site and off-site examination of the institutions. The BSD has adopted a risk-based examination which, among others, involves the following:

- Examining banks on an on-going basis through on-site and off-site examination.
- Allocation of resources is made to banks based on the degree of risk confronting the bank.
- Placing reliance on the banks' management structure and internal control system when found reliable.
- Placing reliance on the banks' external auditors.

2.4 CONCLUSION

Systemic risk is not only crucial for the banking industry but must be viewed within the whole spectrum of financial and non financial system. The global credit crunch did not only collapse banks and other financial institutions but other non financial institutions including automobile companies. It has even caused recession of most developed countries to the extent that the economy of Iceland, a sovereign state was completely shattered. The rescue packages which most of the countries affected by the crisis put in place were meant to ameliorate the situation by not only salvaging institutions, but to a greater extent, restore jobs and other social activities.

It is again clear that the assertion that banks should not be rescued when they take bad decisions (Sir Edward George, 1994, Mervyn King 2006, Mishkin, 2007) is not tenable. Again rescue packages involving emergency liquidity injection based on collateral as expressed in the "Liquidity Insolvency Theorem" propounded by Eichberger and Summer, 2004 would equally be difficult to implement as risk which has assumed systemic dimension does not give room for conditions.

It is also apparent that as a result of liberalisation and globalisation including intensification of cross-border activities most emerging countries including Ghana which have not been directly affected by the direct ravages of the global credit crunch could easily be affected once their economies are closely tied to the world economy.

The foregoing review reinforces the need for an effective and sustainable measure to be put in place to globally curb systemic risk rather than resorting to ad-hoc rescue packages on solo basis.

CHAPTER THREE

3.0 DATA COLLECTION AND PRESENTATION

3.1 INTRODUCTION

The study involves the use of multiple frameworks to identify, measure and control systemic risk in the finance world. It concentrates on risk measurement and control based on a conceptual framework called the "Risk Interactive Framework", where all identifiable risks involving the three traditionally identifiable risks (credit, operational and market) are believed to interact to produce an additional risk known as systemic risk. Systemic risk is then believed to grow at an astronomical and exponential rate as against the 'normal' growth of the individual traditional risks based on an institution's risk appetite, the complexity of the system and the sophistication of the institutions' products.

This chapter mainly includes a discussion on the methodology involving research design, the methods of data collection, identification of the population, sample size, sampling procedures, methods of data analysis, and research instrument. These methodologies are considered under the broader framework of qualitative and quantitative research methods adopted. The study again involved data collection and statistical analysis methods obtained from both primary and secondary data sources. As noted by (Saunders et al: 1997) "A research design or strategy is a general plan of how to go about answering the research questions. It contains the clear objectives, derived from the research questions and specifies the sources of data collection"

The research design is considered a conclusive one and will hence be structured to test specific hypothesis. It again will require clearly defined, formal and structured information with a large sample size to be representative. The study again adopted both qualitative and quantitative methods of data collection. This will be done through administering questionnaires and granting personal

interviews to key staff of the Banking Supervision Department of the bank of Ghana. The quantitative data collection will involve obtaining capital adequacy ratios of the sampled banks over a period of time vis-à-vis the country's GDP over the period. Industry trend of non performing-loans, the proportion of credit, market and operational risks to total risk will also be obtained. The main aim of using both qualitative and quantitative data collection methods is to first and foremost obtain the views of the practitioners and regulators of risk management and corroborate them through quantitative testing. The results are then viewed alongside a consideration of the effectiveness of capital regulation as a measure of risk management over a period of time.

3.2 CONCEPTUAL FRAMEWORK

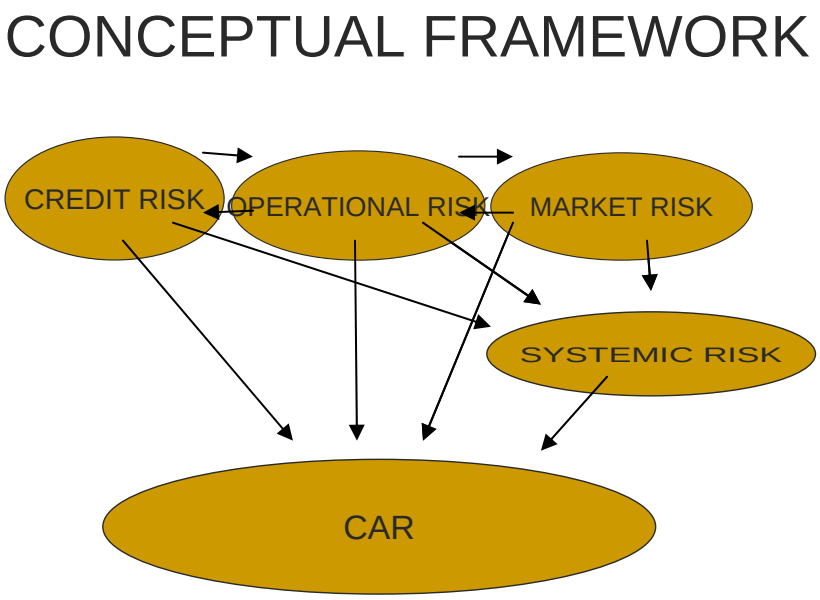
3.2.1 CONCEPTUAL FRAMEWORK APPROACHES

A conceptual framework provides a description of the relationships between concepts being used. The conceptual framework is then used to develop theories that explain the patterns and connections that are found in the research material. The conceptual framework should always be tested against the actual findings of the research. (Fisher et al, 2007). The study is usually simplified by defining the concepts and creating a conceptual framework. The defined concept and conceptual frameworks enables the study to be focused. It is also meant to provide a coherence structure to the study as well as providing guidance in the framing of the research questions. The concepts and conceptual framework could be defined at the beginning of the study (structured approach) or at the end of the study (grounded approach). In the structured approach the study imposes a framework or a structure based on a preliminary theory, concept or hypothesis and uses the structure to guide the research in every respect, including the data collection strategies employed. The grounded approach, on the other hand, as coined by Glaser and Strauss, 1967 "is the process that allows theory to emerge out of the research material rather than being forced out of it by the use predetermined idea or theory". Grounded approach again implies that theory is implicit in the material

and can be drawn out by an iterative process of coding and comparison. (Fisher et al, 2007). This approach is quite frustrating and time consuming since the concepts emerge out of the materials analysed. It however produces quality researchers when done very well.

3.2.2 CONCEPTUAL FRAMEWORK APPROACH ADOPTED

The study adopted a structured conceptual framework approach since its focus from the beginning aimed at reducing the time involved and minimising cost. The conceptual framework of this study is dubbed the "Risk Interactive Framework" (RIF). It conceptualises the relationship between identifiable risks of the traditional financial risks factors, including credit, operational, market and systemic risk, on one hand, and the Capital Adequacy Framework on the other. The RIF intimates that all the identifiable or traditional financial risks interact to produce systemic risk which should be measured and controlled through the capital adequacy ratio framework in addition to the traditional risk factors as depicted below:



The framework shows that the identifiable risk variables such as credit, operational and market risks interact with each other and together produce a synergy in the form of systemic risk which grows astronomically and exponentially. The concept of synergy is based on "…the whole is greater than the sum of the individual parts". Synergy is usually associated with gains especially in mergers and acquisitions of profit orientated organisations. In this case, however, it is considered in terms of losses with respect to risk. It is therefore termed "negative synergy" to emphasise risks and losses associated with the financial system.

3.3 DATA COLLECTION METHODS

Effective data collection methods were employed to collect both primary and secondary data for the purpose of the study. Again, for the purpose of this study, the primary data was collected and used to corroborate the secondary data.

3.3.1 PRIMARY AND SECONDARY SOURCES

(i) Primary Data

These are data that have been originated for the specific purpose of addressing the research problem. The data is usually tailored to meet the specific needs or requirements of the study. The data is usually collected by observation, questionnaires, interviews etc.

(ii) Secondary Data

These are data that have already been collected for other purposes other than the research problem. Before collecting primary data, the study should locate and analyse relevant secondary data. Secondary data is therefore an essential component of a successful research design. The general rule of data collection was stated by Malhotra and Birks, 2007:96 as follows: "Examination of available secondary data is a prerequisite to the collection of primary data. Start with

secondary data. Proceed with primary data only when the secondary data sources have exhausted or yield marginal returns. Secondary data sources have the following advantages, among others:

- easy to access;
- relatively inexpensive; and
- quick to obtain.

According to Kotabe M, 2002 secondary data has a variety of uses including the following:

- diagnose the research problem;
- develop an approach to the problem;
- develop a sampling plan;
- formulate an appropriate research design (e.g., by identifying the key variables to measure or understand);
- answer research questions and test some hypothesis;
- interpret primary data with more insight; and
- validate qualitative research findings.

Due to the assertion that secondary data may not be relevant to the study because it was generated for reasons other than current study, the study would ensure that secondary data is routinely evaluated. Stewart DW, 1984 espoused the following as the criteria for evaluating secondary data.

(i) Specification and research design

The specification or research design used to collect the data would be critically examined to identify possible sources of bias. The specification might include the size and nature of the sample, response rate and quality, questionnaire design and administration, procedures used for field, and data analysis and reporting procedures.

(ii) Error and accuracy

The data would be examined as to its accuracy for the present study. Secondary data may have a number of errors or inaccuracies including errors in the approach,

research design, sampling, data collection, analysis and reporting stages of the project. Multiple sources of secondary data may however be employed to compare standard statistical procedures.

(iii)Currency: when the data were collected

Secondary data are most often not current and may also have a long time lag between data collection and publication. Again the data may not be updated frequently for the purpose of the study. It is for this reason that the study would endeavour to evaluate the data.

(iv)Objective: the purpose for which the data were collected

Data is usually collected with some objective in mind and the objective for collecting the data will ultimately determine the purpose for which the information is relevant and useful. Data collected with specific objective in mind may not necessarily be appropriate in another situation. Where you have different studies with different objectives even though there may be identical questions asked in both studies, the target respondents may be different and the rationale for the study presented to respondents may also be different. For this reason the study shall ensure that the data obtained is appropriate and would suit the purpose for which it was collected.

(v) Nature: the content of the data

The study shall ensure that the nature or content of the data is examined and the key variables, the units of measurement, the categories used and their relationships are determined. The study shall also ensure that the key variables are thoroughly defined in order not to limit the usefulness of the data.

(vi)Dependability: how dependable are the data?

The study shall determine how dependable the data is by examining the expertise, credibility, reputation and trustworthiness of the source. This would be done by checking on others who have used the information provided by the source. It

would also endeavour to obtain data from the original source to ensure its accuracy and completeness.

3.3.2 METHODS OF RESEARCH

A variety of means for data collection were available to the study in the collection of primary data. This could take open or unstructured form on one hand, or pre-coded or structured ones on the other. Open or unstructured method is usually used in exploratory research whilst structured or pre-coded method is used in survey or conclusive research. Exploratory and conclusive research is thus the main research methods used in any research environment.

(a) Exploratory research

The primary objective of exploratory research is to provide insights into and an understanding into a phenomenon. (Halman, I.M, 2002). It is mainly used in instances where the subject of the study cannot be measured in quantitative terms or where the process of measurement cannot realistically represent particular qualities. (Malhotra and Birks, 2007). What this means is that exploratory research helps establish the various variables in the study and how they are connected together. Though not very much, the study exhibits some qualities of exploratory research.

(b) Conclusive research

Conclusive research would be applied to test specific hypothesis and examine the relationships. This would be used because some exploratory researches are deemed to have been conducted to define the problem more precisely, relevant courses of action have been defined and additional insights have been gained. Conclusive research is therefore used because the information needed is clearly defined, the research process is more formal and structured, the sample size is

large and aims to be representative and data analysis is more quantitative. (Malhotra and Birks, 2007).

3.3.3 DATA COLLECTION APPROACHES

The under-mentioned approaches are usually used in collecting primary data, be it exploratory or conclusive research, even though some are more suitable than others.

(i) Document approach

Documentary approach or research is a rhetorical analysis or statistical analysis of a research problem depending on whether it is an exploratory or conclusive or survey research. (Fisher et al, 2007). It can take an open and a pre-coded form. In an open approach to texts and documents the study tries to understand, for instance, how rhetorical techniques are used to try to persuade the reader to a point of view. An open analysis may also involve looking for common narrative structures that are shared by many similar documents. Silverman, 1993 provides an interesting analysis of this. However due to the conclusive nature of the study the pre-coded approach was employed.

(ii) Interview approach

According to Colin Fisher et al 2007, interviews usually take an unstructured, in-depth and open form when conducting exploratory research. In the case of surveys or conclusive research it is more structured and the interviewer keeps to a script with answer options. Open interviews are usually straightforward and the interviewer engages in informal conversation with the respondent about a particular area of interest. The interviewer may steer the interview a little by only picking clues and themes raised by the respondent, otherwise the respondent generally leads the direction of the interview. Pre-coded interviews, on the other hand are controlled by the interviewer and are usually read from prepared scripts. They are usually adopted in conclusive researches. Interviews are considered

direct approaches of primary data collection. Interviews could be done at group levels or as depth interviews. Here, the purpose of the project is disclosed to the participants. (Malhotra and Birks, 2007). The study employed a conclusive interview approach.

(iii)Questionnaire approach

Malhotra and Birks, 2007 defines questionnaire as a formalised set of questions for obtaining information from respondents. It is the only one element of data collection package that might also include:

- Fieldwork procedures, such as instructions for selecting, approaching and questioning respondents;
- Some reward, gift or payment offered to respondents;
- Communication aids, such as maps, pictures, advertisements and products and return envelopes.

The questionnaire used for the study was quite straightforward with simple instructions and no clear incentives attached aside of the fact that it is believed results of the study will improve the industry.

(iv)Panel approach

This is a direct approach where a group of people are brought together to have a free flowing, but focused discussion on a particular topic. Malhotra and Birks, 2007 considers focus group as discussion conducted by a trained moderator in a non-structured and natural manner with a small group of participants. It has been argued that the single most compelling purpose of compelling of focus group is to bridge social and cultural differences between researchers and their participants. (Morgan D.L, 2002). Gordon and Langmaid (1988) list some that must be considered when planning a focus group as follows:

- Decide themes and issues to be discussed.
- Develop protocols for use of information
- Decide the ideal group size
- Choose the categories of people to take part in the discussion

- Determine how long the group is to meet etc.

The study did not particularly employ the panel approach; however, the topic of the study was finally adopted after discussions with two other persons of different backgrounds in the banking industry.

(v) Observation approach

It is an indirect approach and usually disguises the purpose of the project. Here, the study may want participants to behave naturally as possible without any impediment of research purposes. (Malhotra and Birks, 2007). This involves keeping a research diary in an exploratory research and completing an observation schedule in a conclusive or survey research. Usually the degree of openness or pre-coding that can be used in this approach is considered in more detail. (Fisher et al, 2007). This approach was ignored as it was found not suitable by the study

3.3.4 DATA DESIGN

This outlines the general framework for conducting the research project. It details the procedures necessary for obtaining the information needed to structure or solve the research problems. (Malhotra and Birks, 2007). (Saunders et al: 1997) points out that "A research design or strategy is a general plan of how to go about answering the research questions. It contains the clear objectives, derived from the research questions and specifies the sources of data collection". Research designs are mainly used for the purpose of obtaining data for the testing of the hypotheses or answer the research questions. It serves as an outline or a scheme that serves as a useful guide in generating data for the study. (Asika: 1991). The research has been structured such that the ensuing paragraphs will indicate the following:

- information needed:- that both primary and secondary data on systemic risk and the capital adequacy framework will be obtained;
- decide on the overall design- that research will be more conclusive, descriptive or causal than exploratory;

- construct and pre-test an appropriate form for data collection or questionnaire:-that the main methods of collecting primary data will be by structured questionnaire and structured interview and secondary data will be collected from secondary sources such as articles, journals, bulletins, laws etc;
- Specify the qualitative and/or quantitative sampling process and sample size:-primary data of a sample of management staff in the banks and the non bank financial institutions will be obtained.
- Develop a plan of qualitative and /or quantitative data analysis-this involves methods of coding and using graphical means and tabulations, including cross tabulations to analyse the data both quantitatively and qualitatively.

In view of the study seeking to give practical support to practitioners and regulators of risk to take very good decisions on risk affecting the financial system, Malhotra and Birks 2007 suggests that such studies should be based on information that is:

- accurate:- in that the study will ensure that it obtains a valid representation of the phenomenon under investigation, for which data will be sought from the most reliable source, in a consistent form of measurement.
- Current: - that is, the study will endeavour to obtain up-to-date data due to the fast changing global financial system, which in recent times is becoming more and more complexity.
- Sufficient: - the study will ensure that it obtains and presents information assured of completeness and clarity.
- Relevant:- last but not least, the study will ensure that decision-makers, practitioners, and regulators of financial risk will be given enough information to take decisions and will also be given sufficient opportunity and platform to critique the information by making them aware of the benefits, limitations and alternatives.

3.3.5 RESEARCH INSTRUMENTS

The main collection tools for the primary data are structured questionnaire in the form of a schedule and structured interviews since the research is more conclusive than exploratory. Since the questionnaire will be administered to highly technical persons of risk management and regulators of risk and for the fact that the research is more conclusive than exploratory, the responses from respondents are expected to be spontaneous, reasoned and conventional. It is mainly for this reason that a structured method of questionnaire is employed. The questionnaire method was used as the basic research instrument because the data is considered large; it will also make the primary data more meaningful and will easily be understood; it will also give more control over the research process and the questions could be structured etc (Saunders et al, 1997). It is also found to be simple to administer; data obtained is more likely to be consistent because the responses are limited to the alternatives stated; the use of fixed-response questions reduces the variability in the results that may be caused by differences interviewers; and last by not least, coding, analysis, interpretation and the general processing of data are relatively simple when the questionnaire method is used. (Malhotra and McCourt, 2001:235-269).

The questionnaire was designed in a simple format with less technical jargons. The few technical jargons which bordered on capital adequacy ratio and systemic risk were explained in the preamble to the questionnaire. The respondents who are mainly practitioners of risk were motivated by content of the questions which happened to be very topical with the unfolding events of the global credit crunch. This made them emotionally involved and eager to see the results of the study in good time. The questionnaire was in two parts. The first part of the questionnaire was meant to elicit information on the background of the respondent to confirm his or her appropriateness as a respondent. It involved two questions and required a “Yes” or “No” answer as well as the confirmation of the type of institution and

the designation of the respondent. The second part involved twenty-five (25) structured Likert scales questions requiring answers of strongly agree, agree, neutral and disagree. These are calibrated from 1 to 4 where 1 represents strongly agree, 2 agree, 3 neutral and 4 disagree. The Rensis Likert ranking answers was used because the questions mainly relate to the same subject. The responses will be analysed and used to test the hypothesis. Again to avoid the fixed-response alternative questions to result in loss of validity and also to prevent respondents from playing save by choosing the middle answer, response alternatives were restricted to four and follow-up questions were infused to elicit as much information as possible. To assure respondents of confidentiality their names of and places of work would not be solicited. This is meant to ensure that honest information is obtained from respondents. The questionnaire will be personally administered to ensure a good response rate.

A pilot survey was conducted before the main survey so as to obtain feedback on possible bottlenecks that might confront the respondents and design strategies to correct them before the main survey is conducted. This was meant to reduce the error and response rate by ensuring clarity and brevity of the questions. The pilot test was conducted through an interview of some of the targeted respondents on two banks and one non-bank. Feedback from the pilot was used to modify the questionnaire and the interview conducted.

A semi-structured interview was conducted to solicit the views of the Head of the Banking Supervision Department of the Bank of Ghana and his assistant. This also formed the basis of the main questionnaire. Information gathered through interview was also used to supplement the primary information gathered through the questionnaire. “Skilled critical questioning is an effective means of bringing assumptions to the surface. It is concerned not so much of eliciting information as with prompting reflective analysis” Morton Williams J 1993. The interview will thus, among other things, focus on purpose of using capital adequacy regulation as the main source of mitigating risk, whether other risk mitigating strategies acts

as supplements to capital regulation or meant to replace them, whether there has been instances that the Bank of Ghana has increased the capital adequacy ratio of particular institutions based on the risk they posed to the system and last but not least, whether in their view the capital adequacy ratio (CAR) should be expanded to cover all significant quantifiable risk such as risk associated with securitisation and systemic risk .

The second data collection method involved the collection of data from secondary sources. This involved information published or gathered by the Bank of Ghana, articles, journals, bulletins, books, audited accounts, returns from the financial institutions etc.

3.3.6 RESEARCH POPULATION

The banking industry in Ghana was the focal point of data collection. For secondary quantitative data, a census of the whole population consisting of twenty six banks (26) banks and thirty five (35) non banks was considered. A census was chosen the quantitative secondary data because the data is not large and has already been collated by the Bank of Ghana. For primary data collection, fifteen (15) banks and three (3) non banks were sampled for which twenty-eight (28) structured questions were administered to the top ranks of at least five managers in each institution. The sampled elements involved risk managers, internal controllers, financial controllers and the key executive managers of risk management of the sampled units which are the fifteen institutions sampled. A non probability sampling technique was used in selecting the sample. In all a sample size of at least 130 persons was (elements) obtained out of a population of management staff of institutions which comprises about 500 management staff. A large enough sample size was taken:

- to a reduction in the sampling error;
- to enable multivariate analysis techniques to be used;
- to enable the data to be analysed in great detail.

The data collection was validated by screening the respondents and eliminated managers who have nothing to do with the institutions risk management set up. Stratified probability sampling technique was used for the sampling of both primary and secondary data for collection. The population was divided into local and foreign institutions, after which a random sampling technique was employed. The stratified sampling technique was chosen because foreign financial institutions are believed to perceive risk and apply mitigation strategies differently from their local counterparts. The foreign firms are mostly ahead of their local counters because of the support that they obtain from their parent firms. The main motivation of using stratified sampling is to increase precision without necessarily increasing cost. (Kjell, 2000:452; Weerahandi, S, 1995: 85-86). The stratified sampling again employed because it is easy to administer, it saves time and it is less costly.

The banks and non banks sampled together constitute about 80% and 85% of the industry assets of the banks and non-banks respectively. The sampled banks and non banks are as follows:

- Ghana Commercial Bank (GCB),
- Standard Chartered Bank Ghana Limited (SCB),
- Barclays Bank Ghana (BBG),
- National Investment Bank,
- Stanbic Bank Ghana Limited,
- SG SSB
- Prudential Bank,
- CAL Bank,
- United Bank for Africa (UBA),
- Zenith Bank Ghana Limited,
- Fidelity Bank,
- Agricultural Development Bank (ADB),
- Amalgamated Bank,
- The Trust Bank,

The non-banks are:

- Procredit
- First Allied Saving and Loans Limited.
- Unique Trust Financial Services

The questionnaire was administered to 100 persons of whom 82 persons responded. This is considered as a valid representation of the target group. The study will also involve the Bank of Ghana, being the regulator of banks and non banks.

3.4 DESCRIPTIVE DATA ANALYSIS

Descriptive research specifies the methods of selecting the sources of information and collecting data from those sources. It is thus a collective database of the study and consists of a series of research components that relate to collecting data, research design and analysis and collation. It thus involves the population and procedures of sampling as well as data presentation. (Fisher et al, 2007).

3.4.1 SAMPLING DESIGN AND PROCEDURES

The objective of the survey is to obtain information about the characteristics or parameters of the population. A population in this sense is the aggregate of all the elements that share some common set of characteristics and that compromise the universe for the purpose of making the research problem. (Malhotra and Birks, 2007). Information about the population parameters may be obtained by taking a census or a sample. Census, in this case involves, a complete enumeration of the elements in a population. A sample, on the other hand, is a subgroup of the population selected for participation in the study. The sample characteristics were then used to make inference of the population parameters. A census was found to be both costly and time consuming to conduct. Sampling is thus favourable especially when the budget is small and the time is short. Again sampling was found more favourable in the following circumstances, especially:

- when the population size is large;

- when the variance in the characteristics was expected to be small;
- when the cost of sampling errors is low; and last but not least,
- when the cost of non-sampling errors expected to be high.

The opposite of the above is also true when considering a census method. Census can greatly increase non-sampling errors over and above sampling errors of a sample. Non sampling errors are found to be a major contributor to total error, whereas sampling errors have been relatively small. (Anon, 2001; Verma, V and Le, T, 1996; Assael., H and Keon, J., 1982).

3.4.2 SAMPLING DESIGN PROCESS

According to Anon, 1995; Wright, J.D and Anderson, A.B, 1983, sampling design process includes six closely interrelated steps and relevant to all aspects of the project, that is, from problem definition to the presentation of the results. This means that the sample design should be integrated with all other decisions in the research project. They stated steps of the process in sampling design as follows:

(i) Define the target population

The first step of the sampling design process is to specify the target population. The target population is the elements or objects that posses the information sought by the study and about which inferences are to be made. The target population was specified precisely otherwise it will result in an ineffective and (or) misleading research. It was defined in terms of elements, sampling units, extent and time. An element is an object about which or from which the information was desired and this may be the respondent in a survey research. A sampling unit is an element, or a unit containing the element, that is available for selection at the stage of the sampling process.

(ii) Determine the sampling frame

A sampling frame is a representation of the elements of the target population. It usually consists of a list or a set of directions for identifying the target population.

(Cage, R., 1996). Often it is possible to compile or obtain a list of population elements, but the list may omit some elements of the population or may include other elements that do not belong. It means that the use of the list may lead to sampling frame error. (Winter, 2000). The study recognised and treated sampling error redefining the population in terms of sampling frame, thus preventing the study from being misled about the actual population being investigated. (Murphy, G.B., 2002).The major drawback of redefining the population based upon available sampling frames is that the nature of the research problem may be compromised. Sampling frame error was also be accounted for by screening the respondents in the collection phase to ensure that they satisfy the criteria for the target population.

(iii)Select a sampling technique

The study decided whether to use a Bayesian or traditional sampling approach, to sample with or without replacement, and to use non-probability or probability sampling. The various approaches are detailed as follows:-

Bayesian Approach:- In this approach the elements are selected sequentially. After each element is added to the sample, the data are collected, sample statistics computed and sampling costs determined. The Bayesian approach explicitly incorporates prior information about the population parameters as well as the costs and probabilities associated with making wrong decisions.

Sampling with replacement Approach:- In this approach an element from the sampling frame and appropriate data is obtained. The element is then placed back in the sampling frame. As a result it is possible for an element to be selected more than once.

Sampling without replacement Approach:- In this case once an element is selected for the sample, it does not have the chance of being selected again. It is completely removed from the sampling frame. This approach may give the same inference as the first two approaches if the sample frame, and for that matter, the sample size is large even though the calculation of the statistics is different.

(iv)Determine the sample size

The sampling size refers to the number of elements to be included in the study and this involves quantitative and qualitative considerations. According to Malhotra and Birks, 2007, the qualitative factors to be considered may include the following:

Importance of the decision: - The study and the decisions expected are considered very important that more, precise and accurate information is considered very necessary for the purpose of the study.

Nature of the research: - This may also have an impact on the sample size. For instance, for exploratory research designs, such as those using qualitative research, the sampling size is typically small, whereas for conclusive research, such as descriptive surveys, larger sample sizes are required. Since the study is considered more conclusive that exploratory, the sample size is sufficiently large.

Number of variables: - Again data has been collected on a large number of variables. For instance, because many questions were asked in a survey, larger samples were required since the cumulative effect of sampling error across variables is expected to reduce in a large sample.

Nature of analysis: - Again in view of the sophisticated analysis of the data requiring the usage of multivariate techniques and also because data are expected to be analysed in great detail, the sample size should be large. It again follows that a large sample would be required since data are to be analysed at the subgroup or segment level.

Sample size used in similar studies: - The sample size has marginally been influenced by the average size of samples in similar studies. The sample size was determined based on experience and served as a rough guide, particularly when non-probability sampling technique was partially used for the purpose of the study.

Incidence and completion rates: - The sample size required was adjusted for the incidence of eligible respondents and completion rate.

Resource constraints: - The sample size decision was guided by a consideration of the resource constraints. In any research project, money and time are obviously limited.

(v) Execute the sampling process

The execution of the sampling process requires a detailed specification of how the sampling design decisions with respect to the population, sampling unit, sampling frame, sampling technique and sample size are to be implemented. Though the study had considered in advance how the research was going to be executed in terms of the sampling process, once more than one individual is involved, a specification for execution was employed to ensure that the process is conducted in a consistent manner.

(vi)Validate the sample

Sampling validation involves accounting for sampling frame error by screening the respondents in the data collection phase. Respondents were screened with respect to their familiarity with the subject and other characteristics to ensure that they satisfy the criteria for the target population. The screening eliminated inappropriate elements contained in the sampling frame to a large extent, but could not account for elements that have been omitted. The success of the validation process however depends upon the accuracy of the base statistics that described the structure of a target population.

3.4.3 SAMPLING TECHNIQUES

Sampling techniques available to study may broadly be classified into probability and non-probability sampling techniques.

(i) Non-probability Sampling

The study considered that non-probability sampling techniques relies more on personal judgement of the study rather than chance to select the sample. Again the study could arbitrarily decide what elements to include in the sample. Though

non-probability samples may yield good estimates of the population characteristics they do not allow for objective evaluation of the precision of the sampling results. Commonly used non-probability sampling techniques include convenience sampling, judgement sampling, quota sampling and snowball sampling.

Convenience Sampling: - As the name implies this sampling technique attempts to obtain a sample of convenient elements. Usually respondents are selected because they happen to be at the right place at the right time. (Ritchie, L., 2001). It is the least expensive and least consuming of all sampling techniques. The sampling units are accessible, easy to measure and cooperative. The technique however exhibits potential sources of bias, including respondents' self-selection. Convenient sampling is usually not representative of any definable population. Hence it is not theoretically meaningful to generalise to any population from a convenience sample. They are also not appropriate for researches involving population inferences. The study could not recommended convenience for descriptive or causal research purpose; it believed it could favourably be used in exploratory research for generating new ideas, insights or hypothesis as was the case in this research. Again in pre-testing the questionnaires or obtain pilots, convenience sampling was used to select persons in my office as well as friends of mine with requisite background who were in easy reach.

Judgement Sampling:-This is a form of convenience sampling in which the selection of the elements of the population is based on the judgement of the study. The study in exercising judgement chose the elements to be included in the sample it believes by experience or expertise were representative of the population. For instance in some cases Judgement sampling was used, especially in sampling persons from banks in and around the central Bank of Ghana because it was inexpensive, convenient and quick. Though judgement sampling is considered subjective and its value depends entirely on my judgement, expertise and creativity, it was considered useful since it was used with other sampling techniques.

Quota sampling: - It is viewed as a two-stage restricted judgement sampling that is used very often in street interviewing. The first stage involves developing control characteristics, or quotas of population elements such as age, gender etc. To develop these quotas, the study lists relevant control characteristics and determines the distribution of these characteristics in the target population. Usually the quotas are assigned such that the proportion of the sample elements possessing the control characteristics is the same as the composition of the population with respect to the characteristics of interest. The second stage consists of a situation where the sample elements are selected based on convenience or judgement. Once the quotas are assigned there is considerable freedom in selecting the elements to be included in the sample with the only requirement that the elements selected fit the control characteristics. (Thompson, S.K., 2002; Sudman S, 1999). This approach was not employed by the study because it was not suitable for its purpose.

Snowball sampling: - Here an initial group of respondents is selected, sometimes on a random basis, but more typically targeted at a few individuals who are known to posses the target population. After they have been interviewed, the respondents are made to identify others who belong to the same target population of interest. Subsequent respondents are thus based on referrals. By obtaining referrals upon referrals the process is carried out in waves, thus leading to a snowballing effect. Though probability sampling could be used for the initial selection, subsequent selections are based on non-probability samples. The referrals may have demographic and psychographic characteristics more similar to the persons referring them than would occur by chance. (Maher, L., 2001; Frankwick, G. L., Ward, J.C., Hutt, M.D and Reingen, P.H, 1994). The main objective of snowball sampling is to estimate characteristics that are rare in the wider population. The major advantage of snowball sampling is that it substantially increases the likelihood of locating the desired characteristic in the population. It also results in low sampling variance and costs. (Boca Raton, FL, 2000; Henry, G.T, 1995; Kalton, G and Anderson1986; Biemacki, P. and Waldorf, D., 1981). Again, this approach was employed the purpose of

administering the questionnaire because it was found suitable and made the work easy.

(ii) Probability sampling

Probability sampling, on the other hand, are selected by chance. It varies from non probability sampling in terms of sampling efficiency, by considering a trade-off between sampling costs and precision. Precision could be referred to as the level of uncertainty about the characteristics being measured. Precision is inversely related to sampling errors but positively related to cost. All things being equal, the greater the precision, the greater the costs and there is usually a trade-off. The study strived to use the most efficient sampling design, subject to the budget allocated. Probability sampling techniques that were considered are detailed as follows:-

Simple random sampling: - Here each element in the population has a known and equal probability of selection. This is translated to mean that each possible sample of a given size (n) has a known and an equal chance of being the sample actually selected. The sample is drawn at random from a sampling frame. The simple random sampling technique is easily understood and the sample results may be projected to the target population. The technique is however not without limitation. First, it is usually difficult to construct a sampling frame that will allow the drawing of a simple random sampling. Secondly, the technique could result in samples that are very large or spread over a wide geographical area, thus increasing the time and cost of data collection. Thirdly, the technique often results in lower precision with larger standard errors than other probability sampling techniques, and last but not least, it may not result in a representative sample. Although samples drawn will represent the population well on average, a given simple random sample may grossly misrepresent the target population. This sampling technique was employed by the study to select banks which were sampled to administering the primary data. It was however not used for administering the questionnaire on the sample elements.

Systematic sampling: - In systematic sampling the sample is chosen by selecting a random starting point and then picking every 'ith' element in succession from the sampling frame. The sample internal, 'i', is determined by dividing the population size *N* by the sample size n and rounding to the nearest whole number. Systemic sampling is similar to simple random sampling, in that each population element has a known and equal probability of selection. It differs however from simple random sampling in that only permissible samples of size n that can be drawn have a known and equal probability of selection. Systematic sampling is less costly and easier than simple random sampling because random selection is done only once to establish a starting point. Moreover random numbers do not have to be matched with individual elements as in simple random sampling. Systematic sampling could also be used without the knowledge of the sampling frame. This technique was not found suitable for the purpose of the study and therefore not used.

Stratified sampling: - This is a two-step process in which the population is partitioned into sub-populations, or strata. The strata should be mutually exclusive and exhaustive in that every population element should be assigned to one and one stratum and no population elements should be omitted. The next thing is to select elements from each stratum by random procedure, usually by simple random sampling. Stratified sampling differs from quota sampling in that probability sampling is used for the selection of the sample elements rather than convenience sampling or judgement sampling. The major objective of stratified sampling is to increase precision without increasing cost. (Kjell, G., 2000; Weeranhandi, S. And Moitra, S., 1995). Homogeneity, heterogeneity, relatedness and cost are usually the criteria for the selection of the variables. This approach was not employed as it was not found suitable for the purpose of the study.

Cluster sampling:-Here the target population is first divided into mutually exclusive and collectively exhaustive sub-populations. The clusters are assumed to contain the diversity of respondents held in the target population. A random sample of clusters is selected, based on a probability sampling technique such simple random sampling. For each selected cluster, either all the elements are

included in the sample or a sample of elements is drawn based on probability techniques. If all the elements in each selected cluster are included in the sample, the procedure is called one-stage cluster sampling. If the sample of elements is drawn probabilistically from each selected cluster, the procedure is two-stage cluster sampling. A cluster sample can have multiple stages (more than two) and as is multi-sage cluster sampling. The objective of cluster sampling is to increase sampling efficiency by decreasing cost. Elements within the cluster should be as heterogeneous as possible whilst the clusters themselves should be as homogeneous as possible. In cluster sampling, a sampling frame is needed only for those clusters selected for the sample. The study did not particularly employ this sampling technique; however judgement was used in selecting the subgroups (Risk Managers, CEOs, Treasurers' etc) of the sampling frame.

3.4.4 SAMPLE SIZE DETERMINATION

(i) Sampling Distribution

Sampling distribution is the distribution of the values of a sample statistics computed for each possible sample that could be drawn from the target population under a specified sampling plan. (Berenson, M. L, Levine, D.M and Krehbiel, T, 2002). Statistics such as the sample mean and proportion would be computed and used in estimating the true population. Theoretically, to estimate the population parameter from the sample statistic, every possible sample that could be drawn should be examined. In practice however a single sample of predetermined size would be obtained by the study and the sample statistics such as the mean and the proportion would be computed. The important properties of the sampling distribution of the mean, and the corresponding properties for the proportion, for large samples (n=30 or more), are as follows:

- The sampling distribution of the mean is a normal distribution.
- The mean of the sampling distribution of mean or proportion is equal to the population parameter value;

The standard deviation or the standard error of the mean or proportion refers to the sampling distribution of the mean or the proportion and not to a sample or a population.

Often the population standard deviation is usually not known and should be estimated.

The standard error of the proportion can be estimated by using the sample proportion as an estimator of the proportion.

The area under the sampling distribution between any two points can be calculated in terms of z value. The z value for a point is the number of standard errors a point is away from the mean.

When the sample size is 10% or more of the population size, the standard error formulae will over estimate the standard deviation of the population mean or proportion.

(ii) Statistical approaches to determining sample size

In determining the sample size of a population of the research the following qualitative factors were considered:

- the importance of the decision,
- the nature of the research,
- the number of variables,
- the nature of the analysis,
- sample size used in similar studies,
- incidence rates,
- Completion rates, and
- Resource constraints.

The statistically determined sample size is the net or final sample size, that is, the sample remaining after eliminating potential respondents who do not qualify or who do not complete the interview. Though the incidence and completion rates, were quite minimal a large sample size was obtained to make for such incidences.

Confidence interval approach: - The confidence interval approach to sample size determination was based on the construction of confidence intervals around the sample means or proportion using the standard error formula. It was used to estimate an interval within which a fixed proportion of the sample mean will fall, given an estimated confidence interval.

3.4.5 SAMPLE DESIGN AND PROCEDURES ADOPTED

The study adopted sampling procedures as against complete census because the nature of the study is such that a complete census will be time consuming, expensive and generally impractical to do so. The sampling approach was again adopted because the budget of the study is limited and the research is being done within limited time constraints. Again considering the nature of study, the cost of sampling error would be very low as against a high non-sampling error. In the sampling design process, the study chose a target population of risk managers and decision making executives on financial risk, such as the managing directors, deputy managing directors, general managers, risk managers etc. This category of the population (who are believed to have the sufficient knowledge of the subject) was chosen to minimise or avoid sampling error risk. The study again adopted a relatively large sample size because the subject is considered very important and has come handy especially in the wake of the global credit crunch. Again, the size of the sample is informed by the conclusive nature of the study. It also considered that since the research requires sophisticated analysis involving multivariate techniques, the sample size must be large. The study also chose to validate the sample by disregarding or removing all the elements that do not matter from the sample. For instance respondents who do not manage risk or take decisions of financial risk were eliminated.

The research adopted the snowballing sampling techniques by initially selecting banks at random (simple random sampling) based on a data compiled by the Banking Supervision of the Bank of Ghana, and selecting the relevant functions and designation of banking staff who are to answer the questionnaire by

judgement. The frequency distribution of the data adopted is based on chi-squared distribution, because the study involves the study of complex relationship of traditional risk variables (credit, operational and market risks) and capital; for which a statistical significance of association of cross tabulation is required.

3.5 METHODS OF DATA ANALYSIS

3.5.1 QUALITATIVE DATA ANALYSIS METHODS

Qualitative data preparation

Having collected data it is then prepared for analysis. Preliminary plan is formulated at the design stage and succeeded by checking for acceptable questionnaires. This would then be followed by editing, coding and transcribing the data. The data are then cleaned and a treatment for missing responses is prescribed. Data preparation was started as soon as the first batch of questionnaires was received from the field, while the fieldwork was still going on. This means that if any problems are detected, the fieldwork could still be modified to incorporate the corrective action. (Malhotra and Birks 2007).

Questionnaire Checking

This process started with reviewing all questionnaires for completeness. According to Harristithal, J, 1998, "completed questionnaire from the field often have many small errors because of the inconsistent quality of interviewing". A questionnaire returned from the field may be unacceptable for the purpose of the study for several reasons including the following:

- Parts of the questionnaire may be incomplete;
- The pattern of responses may indicate that the respondent did not understand or follow the instructions;
- The responses show little variance.

The returned questionnaire is physically incomplete, for example, one or more pages missing.

The questionnaire is received after the pre-listed cut-off date.

The questionnaire is answered by someone who does not qualify for participation.

Editing

This involves the review of the questionnaire with the objective of increasing accuracy and precision. It would involve screening questionnaires to identify illegible, incomplete, inconsistent and ambiguous responses. Responses may be illegible if they have been poorly recorded. The data must be legible if they must be properly coded. Again at this stage preliminary checks are made for consistency. Where more than one answer is ticked by the respondents it would be edited. Unsatisfactory responses would be treated as follows:

- Returned to the field where the interviewers could re-contact the respondents. This would be applied to close respondents who are in easy reach.
- Assign missing values. That is, where returning the questionnaire to the field is not feasible the unsatisfactory responses would be assigned missing values. This approach would only be used when it found that:
    - the number of respondents with unsatisfactory responses is small;
    - the proportion of unsatisfactory responses for each of the responses is small; or
    - the variables with unsatisfactory responses are not key variables.
- Discard unsatisfactory respondents. This approach may have merit when:
    - the proportion of unsatisfactory respondents is small;
    - the sample size is large;
    - the unsatisfactory respondents do not differ from satisfactory respondents in obvious ways;
    - the proportion of unsatisfactory responses for each of these respondents is large; or
    - responses on key variables are missing. (Malhotra and Birks 2007).

Coding

Coding means assigning a code, usually a number, to each possible answer to each question asked. For every single question in a questionnaire, the codes should be assigned were decided to all possible answers. After assigning codes to individual question, responses are set out in consecutive series of fields or columns. These fields would represent answers to particular questions that are positioned in the files especially where coding is done electronically. In each row of the computer would be coded responses from individual respondents. The row is termed a record, that is, all the fields that make up the response from one respondent. The survey analysis packages would record a unique ID for each record so that, as the answers to an individual questionnaire are entered, the ID is automatically updated. A summary of the whole questionnaire, showing the position of the fields and the key to all the codes, would be produced as a form of a codebook. A codebook contains instructions and the necessary information about the questions and potential answers in the survey. A codebook guides the 'coders' in their work and helps to identify and locate the questions properly. (Malhotra and Birks 2007). The study may consider another option of entering the verbatim responses directly onto the computer and allow a print-off of the collective responses and codes to be assigned before all of the questionnaires have been entered.

Data Transcription

This involves keying the coded data from the collected questionnaires into the computer.

Data may also be transferred by using mark sense forms, optical scanning or computerised sensory analysis. For instance mark sensing forms require responses to be recorded in a pre-designed area coded for the response, and the data can then be read by machine. This of some of the secondary data may be transferred through this means.

Data Cleansing

This involves checks and treatment of missing responses. Though preliminary consistency checks were made when the data was edited more thorough and extensive checks were again done at this stage because of the usage of the computer. The following general checks were done:-

Consistency checks:-these identify data that are out of range or logically inconsistent or have extreme values. Out-of-range data values are inadmissible and must be corrected. The study programmed the software to identify out-of-range values for each variable and that the variable should not progress to another variable within a record until a value in the set range is entered. Sometimes the packages were programmed to print out respondent code, variable code, variable name, record number, column number and out-of-range value. (Cronk, B.C, 2002; Aster, R, 2002; Sincinch, et al, 2002; Middleton, M.R, 2002). Extreme values that result from errors were thoroughly examined, as they may be pointers to problems with the data.

Treatment of missing responses: - Missing responses represent values of a variable that are unknown either because respondents provided ambiguous answers or because their answers were not properly recorded. Allison, P.D, 1987 noted that treatment of missing responses poses problems, especially where the proportion is more than 10%. He thus suggested the following options as treatment of missing responses:

Substitute a neutral value: - Here we substitute a neutral value, typically the mean response to the variable for the missing responses. Thus the mean of the variable remains unchanged, and hence does not affect other statistics such as correlations etc. Although this approach is found with some merits by Malhotra and Birks, 2007, they believe the logic of substituting a mean value for respondents who might have used high or low ratings if they had answered is questionable. They believe a meaningful and practical value should be imputed and the value imputed

should be a legitimate response code. The study did not employ this technique because of its demerits.

Substitute an imputed response: - Here the respondents' pattern of responses to other questions is used to impute or calculate a suitable response to missing questions. The study thus attempts to infer from the available data the responses the individuals would have given if they had answered the questions. This can be done statistically by determining the relationship of the variable in question to other variables based on the available data. This approach however requires considerable effort and can introduce serious bias. (Murphy, K.M, 2002; Kara, A., Nielsen, C Sahay and Sivavasubramaniam, N 1994). The study employed this technique in few respects especially when it was noticed that most respondents answered questions based on their background and profession.

Casewise deletion: - Here cases or respondents with missing responses are discarded from the analysis. Because many respondents may have some missing responses, the approach may result in a small sample. However deleting large amounts of data is undesirable because it is costly and time consuming to collect data. Also respondents with missing responses could differ from respondents with complete responses in systematic ways. In view of this it is considered that casewise deletion could seriously bias the results. The study employed this technique in limited cases where the respondents failed to respond to a whole page of questions.

Pairwise deletion: - In this case, instead of discarding all cases with any missing responses, only the cases or respondents with complete responses for each calculation are used. As a result different calculations in an analysis may be based on different sample sizes. This approach may only be appropriate when (1) sample size is large, (2) there are few missing responses, and (3) the variables are not highly related. However, this approach may not produce appealing and feasible results. (Malhotra and Birks 2007). This approach was not employed by the study based on its demerits.

Qualitative data analysis strategy

Qualitative data analysis involves firstly, assembling qualitative data in their rich and varying formats; the second stage involves reducing the data; that is, selecting, classifying and connecting data that is believe will be of great significance; third involves the display of data, that is, using graphical means to display the meaning and structure that is s seen in the data which have collected; and last but not least stage involves verifying data. Data analysis strategies employed by the study broadly involves four main processes:

Data assembly

Data assembly means the gathering of data from a variety of sources. The study employed variety of data assembly techniques including the following:

- Notes taken during or after interviewing or observation:- Field notes is very useful in keeping record of the formal process of data analysis as well as categorising and interpreting data collected. (Malhotra and Birks 2007). Mareck, M, 2004 suggests four sets of specific notes to be kept to help systematise the process so as to improve reliability, as follows:
    - Short notes should be made at the time of observation or interview;
    - Expanded notes should be made as soon as possible after each session of interviews or observation;
    - A fieldwork journal should be obtained to record problems and ideas that ideas that arise during each stage of the fieldwork; and
    - A provisional running record of analysis and interpretation must be maintained.

All of these were employed by the study in the interview process.

- Reflections of researchers, moderators or observers involved in the data collection process: - This involves deciding lines of enquiry which should be developed and those which should be dropped after getting more insight after the interview or the observation.
- Theoretical support-from secondary data, intelligence or literature sources;
- Documents produced by or sourced from participants;

- Photographs, drawings, diagrams such as still visual images;

Data reduction

This involves organising and structuring the data. Reading through the data and editing the transcripts are part of data reduction. It also involves the process of coding the data, which means breaking down the data into discrete chunks and attaching a reference to those chunks of data. (Malhotra and Birks 2007). The study manages, organises and retrieves qualitative data by assigning labels or codes to the data, based upon how the data has been meaningfully organised or coded. Coding is thus the process of bringing together participants' responses into categories that bring together similar ideas, concepts, themes, or steps or stages in the process. (ESOMAR-Industry study, 2004). Malhotra and Birks 2007 coding again involves the following:

Retrieve data:- this would be done by searching for particular words or statements that fit other words or statements from the whole mass of data;

Organise the data: - this would involve the recording of words or statements which are put alongside one another and the similarities and differences evaluated.

Interpret data: - this would involve organising and retrieving words and statements in different ways as well as making different interpretations of the similarities of the data.

Data display

It is an organised, compressed assembly of information that permits conclusion drawing and action. (Miles and Huberman, 1994). Data would be displayed by a combination of text (very cumbersome), matrices, graphs, charts and networks. Display of data is meant to assemble information into an immediately accessible compact form so that it could be analysed properly and either draw justified conclusions or move on to the next step of analysis that the display suggests may be useful. Display also allows a public view of how the analysis of the study has made connections between the different data chunks. The display may be in graphical format, with boxes summarising issues that have emerged and

connecting arrows showing the interconnections between issues. (Malhotra and Birks 2007). Some of the data may also be manually or electronically displayed through the spreadsheet by summarising the data in rows and columns. Another means that the study may display data is through use of qualitative cross tabulation. Cross tabulation is often used to analyse questionnaire results and chi-squared can be used in association with it. (Fisher et al 2007). This involves simple classification participants by a variable that could help the analyst display differences in the number of incidences that a specific code emerges. Different notes, images or any other supplementary could be pasted onto the cross tabulation to help in the interpretation. (Malhotra and Birks 2007), (Fisher et al 2007). With an analysis package, quite distinctive structures for participant types may be mapped, with the ability to tap into supporting evidence in actual categories or in the links between categories. (Miles and Huberman, 1994)

Data verification

Data verification involves seeking alternative explanations through other data sources and theories. The study will verify data with other data sources especially where there are regularities, patterns, explanations, configurations, casual flows and propositions with those data sources. These meanings are formed study especially by maintaining openness and scepticism, and developing conclusions that are embryonic and vague at first, but becomes increasingly explicit and grounded. Final conclusion may not appear until data collection is over, depending on the volume of data collected in all their forms, coding, storage and retrieval methods used, and resource constraints placed upon them by the study. When the final conclusions have been drawn, the study shall demonstrate that valid meanings of the data collected have been presented. The study will again demonstrate that the structure or meaning that is seen is not just a reflection of my views. (Malhotra and Birks 2007).

The data would also be verified through seeking ‘similar’ research findings and explanations taken from different contexts, different time frames and different

researchers. (Griseri, P, 2002). Silverman, D, 2001 suggests two forms of validation which were considered by the study. These are the following:

Triangulation: - this is a term derived from navigation, where different bearings give the correct position of an object. In research terms, comparing different kinds of data (e.g. dialogue and photographs, quantitative and qualitative) and different methods (e.g. observations, interviews etc.) allows reflection upon the extent of corroboration, and what may be the causes of any differences. (Patton, M, 1990).

'Participant validation':- this involves taking one's findings back to participants understudy. More confidence is given in the validity of the findings where feedback from participants' emergent conclusions is verified by them. (Kirk, J. and Miller, M, 1986).

3.5.2 QUANTITATIVE DATA ANALYSIS METHODS

Qualitative data adjusted for quantitative analysis

Quantitative data deals with figures. Thus quantitative data analysis methods are methods used in analysing figures. Qualitative data could even be analysed quantitatively after it has gone through all the qualitative analysis processes and has sometimes been adjusted statistically. Procedures for statistically adjusting data consist of weighting, variable specification and scale transformation.

Weighting: - Here, each case or respondent in the database is assigned a weight to reflect its importance relative to other cases or respondents. The effect of weighting is to increase or decrease the number of cases in the sample that posses certain characteristics. Weighting is usually used to make the sample more representative of a target population on specific characteristics. For instance, if a study is conducted to determine what modification to make to an existing product, the contribution of existing users may be given a weight over other respondents. (Bartholomew, D.J, 2002). The method was not employed by the study as the target was carefully selected to involve elements or persons who are knowledgeable in the field.

Variable re-specification:-This involves the transformation of data to create new variables or to modify existing ones. The purpose of re-specification is to create variables that are consistent with the objectives of the study. The process of re-specification involves the use of dummy variables for re-specifying categorical variables. This technique of data re-specification was not employed by the study.

Scale transformation: - This involves the manipulation of scale values to ensure comparability with other scales or otherwise to make the data suitable for analysis. Usually different scales are employed for different variables. For instance, some respondents may consistently use the upper end of rating scales whereas others consistently use the lower end. These differences could be sorted out by appropriately transforming the data. A more common transformation procedure is standardisation. This is a process of correcting data to reduce them to the same scale by subtracting the sample mean and dividing by the standard deviation. Standardisation allows the study to compare variables that have been measured using different types of scales. (Johnson, R.A and Wichern, D.W, 2001). This technique was not employed by the study as the scales employed did not result in lower and upper scale.

Quantitative data analysis strategy

The statistical techniques for summarising quantitative data include the methods of determining measures of central tendency, as well as measures of dispersion. Measures of central tendency include the median and mean, whilst measures of dispersion include the range and standard deviation. These methods of central tendencies and methods of dispersion were employed by the study for the purpose of summarising and analysing the data.

Median:-The median value is a representative value that indicates the centre of distribution. It splits the distribution of data into half. This means there are as

many values greater than the median as there is less. The median is a good way of summarising data when there are a few extreme (high or low) values observed.

Mean: - The arithmetic mean is the average of the sample. It is calculated by adding together all the observed variables and dividing by the number of observations. As a measure of central tendency, the mean has an advantage since it is usually stable from one sample to another. However were there are extreme values the mean is distorted.

Range: - It is the elementary form of measure of dispersion. It is a simple calculation where the lowest value is subtracted from the highest value. The range is usually not reliable as it depends on two extreme values or cases which may be outliners and therefore not typical of the sample.

Samples and test of Significance

Statistical techniques

Statistical techniques may be classified as univariate or multivariate. Univariate techniques are appropriate in situations where there is a single measurement of each element in the sample or when there are several measurements of each element but each variable is analysed in isolation. Multivariate techniques, on the other hand, are considered useful for analysing data when there are two or more measurements of each element and the variables are analysed simultaneously. Multivariate techniques differ from univariate techniques in that they move away from averages and distributions or variances of the phenomena, and concentrated instead of the degree of relationships, that is, correlation or covariances. (Tacq, J., 1996). Univariate techniques could also be classified based on whether the data are metric or non-metric. Metric data are measured on an interval or ratio scale, whereas non-metric data are measured on a nominal or ordinal scale. The number of samples is determined based on how the data is treated for the purpose of

analysis and not how the data is collected. Samples are said to be independent if they are drawn randomly from different populations.

Statistical test for quantitative data

Z test and t test are usually used for metric data when there is only one sample. Thus the t-test is used to test difference in mean scores of two groups. (Malhotra and Birks 2007). When there are two or more independent samples, the z test and t test can be used for two samples and one-way analysis of variance (ANOVA) or F-statistics can be used for two or more samples. In summary the t-test is usually used in testing two means whilst the F-test is used in testing several means. (Fisher et al, 2007). For non-metric data involving a single sample, frequency distribution, chi-square, Kolmogorov-Smirov (K-S), runs and binomial test can be used. For two independent samples with non-metric data, the chi-square, Mann-Whitney, medians, K-S and Kruskal-Wallis one way analysis of variance (K-W ANOWA) can be used. (Malhotra and Birks 2007). The study employed the chi-squared test for the analysis.

Multivariate statistical techniques can be classified as dependence techniques or interdependence techniques. Dependence techniques are appropriate when one or more variables can be identified as dependent variables and the remaining ones as independent variables. When there is only one dependent variable, cross tabulation, analysis of variance and covariance, multiple regression, two group discriminate analysis and conjoint analysis can be used. Where there is more than one dependent variable, however, the appropriate techniques are multivariate analysis and covariance, canonical correlation and multiple discriminant analyses. In interdependence techniques, the variables are not classified as dependent or independent; rather, the whole set of interdependent relationship is examined. These techniques usually focus on either variable interdependence or inter-object similarity. The major technique for examining variable interdependence is factor analysis. Analysis of inter-object similarity can be conducted by cluster analysis

and multidimensional scaling. (DeSarbo, W. S. 2001; Carroll, J.D and Green, P. E 1997). The study employed the multi-regression analysis technique since the capital charge is the only dependent variable in the relationship.

Analysing relationships

Correlation

Correlation analysis is a measure of association or relationship between two or more variables, and is calculated from standardised measures of covariance. There are three kinds of correlation: position, negative and zero or neutral correlation. With positive correlation changes in one variable are accompanied by changes in the other variables and in the same direction. Negative correlation may also happen when two variables changes in the same direction and zero correlation may happen if there is no clear tendency for the values of one variable to move in a particular direction with changes on another variable. Correlation does not only vary according to direction but also according to the strength of the relationship. The strength of relationship is called correlation coefficient and is denoted by (r) which can only lie with -1 and +1.

Analysis of variance (ANOVA) and covariance (ANCOVA)

Analysis of variance and analysis of covariance are used for examining the differences in the mean values of the dependent variable associated with the effect of the controlled independent variables, after taking into account the influence of uncontrolled independent variables. Analysis of variance (ANOVA) is used to test the means of two or more populations. In its simplest form analysis of variance must have a dependent variable that is metric and the independent variables must all be categorical or non-metric (or factor). One-way analysis of variance is only one categorical variable or a single factor and in this a treatment is the same as a factor level. A combination of factor levels is called treatment. If two or more factors are involved, the analysis is termed n-way analysis of variance.

ANCOVA is where the set of independent variables consists of both categorical and metric variables. ANCOVA can include more than one independent variable or covariates. Regression analysis, like ANOVA and ACOVA may also involve more than one independent variable. All the independent variables are usually interval scaled, although binary or categorical variables can be accommodated using dummy variables. The study employed ANCOVA in the analysis as the data involved both metric and non metric variables.

Comparing proportions

Since the study involved relationships and proportions of variables it considered varying relationship techniques including the chi-squared test. The chi-squared test is the most widely used categorical variable test in the social sciences used to analyse proportions. The test indicates whether the collected data are close to the value considered to be typical and generally expected, and whether two variables are related to each other. The steps in chi-squared test involve:

- Construction of contingency tables;
- Observed frequencies identified and expected frequencies ascertained;
- Expected frequencies are subtracted from the from the observed frequencies; and
- The differences should be squared and divided by the number of expected frequencies.

Chi-squared test could also be used in conjunction cross-tabulation to put the proportions in perspective as cross-tabulation (often used to answer questionnaire) usually involves comparing respondents answers to one question in a question in relation to their answers to other questions. Both the chi-squared test and cross-tabulation techniques were employed in the study.

Regression analysis

Regression analysis is a powerful and flexible procedure for analysing associative relationships between metric-dependent variable and one or more independent variables. Closely in line with the study Malhotra and Birks, 2007 mentions the following ways which can be used:

- To determine whether the independent variables explain a significant variation in the dependent variable. That is whether a relationship exists;
- To determine how much of the variation in the dependent variable can be explained by the independent variable. That is the strength of the relationship;
- To determine the structure or form of the relationship. That is the mathematical equation relating to the independent and dependent variables.
- To predict the values of the dependent variable.
- To control for other independent variables when evaluating the contribution of a specific variable or set of variables.

Regression analysis is concerned with the nature and degree of association between the variables and does not imply or assume any causality. Regression analysis may either be bivariate or multiple regression. The regression model makes a number of assumptions:

- The error term is normally distributed. For each fixed value of *X*, the distribution of *Y* is normal. (Miles, J. and Shevlin, M., 2001; Draper, N.R. and Smith, H., 1998).
- The means of all the normal distributions of *Y,* given *X,* lie on a straight line with slope *b.*
- The mean of error term is zero.
- The variances of the error terms are uncorrelated. That is the errors have been drawn independently.

Bivariate regression analysis: - It is a procedure for deriving a mathematical relationship, in the form of an equation, between a single metric-dependent or criterion variable and a single-metric independent or predictor variable. The analysis is similar in many respects to determining the simple correlation between

two variables. However, since an equation has to be derived, one variable must be identified as a dependent variable and the other an independent variable. The study did not adopt bivariate analysis as it involved multiple dependent variables.

Multiple regression analysis: - As mentioned above the study considered multiple regression analysis as it involved one dependent variable and four independent variables. Multiple regression analysis involves a single dependent variable and two or more independent variables. Most of the statistics and statistical terms considered under bivariate regression also apply to multiple regressions. In addition, it includes coefficient of multiples determination $\boldsymbol{R^2}$. The coefficient of multiple determination is adjusted for a number of independent variables and a sample size to account for the diminishing returns. After the first few variables the additional independent variables do not make much contribution. Coefficient of multiple determination or the square of the multiple correlation coefficient $\boldsymbol{R^2}$ is used to measure the strength of association in multiple determination. The steps involved in conducting multiple regression analysis are used to those for similar bivariate regression analysis. The study in considering multiple regression analysis would go through the following:

Plot the scatter diagram;

Formulate the general model;

Estimate the parameters;

Estimate standardized regression coefficient;

Test for significance;

Determine the strength and significance of the association;

Check for prediction accuracy;

Examine the residuals, and

Cross-validate the model.

Stepwise regression: - The purpose of stepwise regression is to select, from a large number of predictor variables, a small subset of variables that account for the most of the variation in the dependent variable. In this procedure, the predictor variables enter or are removed from the regression equation one after the other.

(Schmitt, N., 1999). Stepwise regression procedures do not result in regression equations which are optimal, in the sense of producing the largest R^2, for a given number of predictors. (Ittner, D. and Larcker, D.F 1997). Because of the correlation between predictors, an important variable may never be included or less important variables may enter the equation. To identify an optimal regression equation, combinational solutions in which all possible combinations are examined would be computed. However stepwise regression can be useful when the sample size is large in relation to the number of predictors.

Multi-co linearity: - Stepwise regression and multiple regression analysis are complicated by the presence of multi-co linearity. Virtually all multiple regression analyses in involve predictors or independent variables that are related. Multi-co linearity arises when inter-correlations amongst the predictors are very high. (Greeberg, E, and Parks R.P, 1997). Multi-co linearity can result in several problems including the following:

(i) Partial regression coefficients may not be estimated precisely. The standard errors are therefore likely to be high.

(ii) The magnitude as well as the signs of the partial regression coefficients may change from sample to sample.

(iii) It becomes difficult to assess the relative importance of the independent variables in explaining the variables in the dependent variable.

(iv) The predictor variables may be incorrectly included or removed in stepwise regression.

The study would consider the suggested steps of Selthi, R, Smith, D.C and Whan Park, 2001 in dealing with multi-co linearity. This involves varying its complexity by using one of the variables in a highly correlated set of variables. Other techniques such as ridge regression and latent root regression can also be used. (Billor, N., 1999)

3.5.3 JUSTIFICATION OF DATA ANALYSIS METHODS ADOPTED

The data of analyzing method that would be adopted would depend on whether the data was collected qualitatively or quantitatively. The study will use a combination of qualitative and quantitative data since it involves the use of primary and secondary data. The analysis intends employing the appropriate strategy such that it will easily throw-up the meaning of the project. As noted by Coffrey and Atkinson, 1996 "Analysis is a persuasive activity throughout the life of a research project. Analysis is not simply one of the later stages of research, to be followed by an equally separate phase of writing results."

The qualitative data collected will largely be analyzed through of narrative notes. It will also be quantitatively analyzed through the use of structured questionnaire and interview which are coded and calibrated into pseudo quantitative data for easy analysis. Field note books or dairies will be maintained by jotting comments of respondents as the questionnaire is administered and responses collected to help illuminate analysis. This strategy is also employed to help generate a deeper and more general sense of the study. For the purpose of the interview, the study will apply the following:

- Take short notes at the time of the interview;
- Expand the notes made as soon as possible after each session of interviews;
- Maintain a field journal to record problems and ideas that arise during each stage of the field work;
- Will provisionally run a record of analysis and interpretation.

The study will codify and label the qualitative data into categories of risk management practitioners (involving heads of risk managers), decision takers on risks (involving the CEOs, COOs CFOs etc), enforcers of risks (involving the regulators, compliance officers, internal auditors etc.) so as to bring similar ideas, concepts and themes together from respondents of different backgrounds. This will enable the study to draw up appropriate meaning based on the views postulated by the various categories of respondents. The coding and

categorization will therefore enable the study retrieve and organize data for further interpretations and draw justified conclusions. The codes will also be considered in terms of views and phrases such as capital regulation, systemic risks, banks and non banks. The study will try to establish the differences between the different types of participants, by looking at the type of institutions, whether local or foreign; develop models of interconnectivity amongst the coded categories by using graphical modelling to explain the sequence of events and finally iterate between the code descriptions and the model being developed. The study will seek to verify data through restricted participant validation. This means that the data results or findings will be taken back to some participants; in this case, the risk managers who are considered as perfect representation of risk practitioners and the regulators who are also considered a true representation of risk enforcers, to assess whether the results are in line with their thinking. Again, the results will be corroborated with similar work done by such researchers as Persaud and Spratt (2005) and Archaya, (2006).

The study will endeavour to establish primary causal relationship between the factors by eliminating all other causal factors or at least control them. Evidence of concomitant variation and time order occurrence of the variables will also be considered to obtain evidence of a very good relationship.

3.5.4 HYPOTHESIS TESTING

Hypothesis testing procedures are classified as tests of associations or tests of differences. It is used in analysing data, whether qualitative or quantitative. Hypothesis testing usually follow the under-mentioned steps:

Formulate the null hypothesis H_0 and the alternative hypothesis H_1:- This is a statement of the status quo, that is, one of no difference or effect. If the null hypothesis is not rejected, no changes will be made. An alternative hypothesis is

one that will lead to changes in opinions or actions. Alternative hypothesis is thus the opposite of null hypothesis. The null hypothesis is always the hypothesis that is tested. The null hypothesis refers to a specified value of the population parameter (e.g. μ, π, and σ) and not a sample statistic (X). A null hypothesis may be rejected but it can never be accepted based on a single test. If the null hypothesis is rejected, then the alternative hypothesis will be accepted. The null hypothesis could be a one tail test or two-tail test depending on whether the alternative hypothesis is emphasises a direction or not. Where it gives a preferred direction then it is a one-tailed test and where no preferred direction is given then it is a two-tailed test.

(i) **Select an appropriate statistical technique: -** To test the null hypothesis an appropriate statistical technique would necessarily have to be selected by the study. The computation of the test statistics and the sampling distribution would be considered. The test statistic measures how close the sample has come to the null hypothesis. It always follows a well known distribution such as the normal, *t*, or chi-square distribution.

(ii) Choose the level of significance: - There is always a risk of the study making an inference about a population will draw an incorrect conclusion. These errors may either take the form of a type one error or a type two error. A 'Type one error' (□) is committed when the sample results lead to the rejection of the null hypothesis when it is true and must be accepted. The selection of a particular risk levels should depend on the cost of making a type one error. Type-two (□) error occurs when, based on the sample a result, the null hypothesis is not rejected when in fact it falls and must be rejected. A level of significance is the probability of committing a type-one error or rejecting null hypothesis when it must be accepted. An extremely low value of type-one error could lead to high type-two errors. Usually a compromise type-one error is set at 0.05 or 0.01. The study however adopted 0.05% as the compromised type-one error.

(iii) Collect the data and calculate the test statistics: - The sample size is determined after taking into account the desired type-one and type-two errors and other qualitative considerations such as budget constraints. The required data is then collected and the value of the test statistic is computed.

(iv) Determine the probability or the critical value: - This is determined by calculating the critical value by obtaining the z-scores from statistical tables and this will determine the probability of the sample.

(v) Compare the probability or critical values and make the decision: - Here the probability associated with the calculated or observed value of the test statistics is compared with the test statistics and a decision is taken. If the probability associated with the calculated or observed value of the test statistics is less than the level of significance, the null hypothesis is rejected and vice versa.

3.5.5 HYPOTHESIS TESTING APPLIED

Two hypotheses have been identified for the study.

The Null Hypothesis (H_o):

1. Ho: Systemic risk of financial institutions can be effectively measured.

2. Ho: The framework of capital adequacy ratio of financial institutions should include systemic risk.

The Alternate Hypothesis (Hi):

1. Hi: Systemic risk of financial institutions cannot be effectively measured

2. Hi: The framework of capital adequacy ratio of financial institutions should not include systemic risk.

The hypotheses would be tested based on the Chi-square test as the test statistic at a confidence level of 95%. The chi-square test is considered more appropriate because the study will be considering both parametric and non parametric tests.

3.5.6 SOFTWARE FOR DATA ANALYSIS

Jankowiczs (1995:76) argued that "the breakpoint at which it becomes sensible to use software to analyse your results is 100 questionnaires". However, one might even prefer to use software if there are more than 30 questionnaires. Where cross-tabulations are used then the study cannot do without the usage of computer software for the analysis. This is because doing cross tabulation manually is very time consuming as the questionnaires have to be frequently sorted out into different sub-categories and the percentages recalculated. Several software packages are available for usage. For instance excel may be used to analyse simple and descriptive statistical data analysis. However, if more complex analysis are involved such as using cross tabulations through pivot tables then other packages such as Minitab, Statistical Package for the Social Sciences (SPSS), would be best suited.

Minitab

The Minitab offers a wide variety of facilities; from modest bar charts to sophisticated multivariate analysis. Minitab is more user-friendly to researchers who are unfamiliar with statistical work. It is a general- purpose statistical package originally developed for academic use by staff at Penn State University in 1972. Minitab is relatively straightforward and the most recent version is in the windows format and data can be entered directly into worksheets, or read from (and written to) Excel, Quattro Pro, 1-2-3 and dBase files. Output can be printed directly, copied and pasted into Word or PowerPoint, or assembled in a file using

the ReportPad facility in the package. The ReportPad can be subsequently accessed and edited in Word.

E-views

'E-Views' (Econometric Views) is a statistical package for windows, used mainly for time series econometric analysis. It is developed by Quantitative Micro Software (QMS). The version 1 of the programme was originally released in March 1994. It was mainly produced to replace Micro TSP. The current version of the software, version 7 which was used by this study for the analysis was released in December 2009. E views can be used for general statistical analysis and econometric analysis, such as cross-section and panel data analysis and time series estimation and forecasting. It again could be combined with spreadsheet and relational database technology with traditional tasks found in statistical software, and uses a Windows GUI. This could be combined with programming language to display limited object orientation. 'E views' relies heavily on proprietary and undocumented file format for data storage. However, for input and output it supports numerous formats, including databank format, excel formats, PSPP/SPSS, DAP/SAS Strata, RATS and TSP. E views can access ODBC databases. Again E views file formats can be partially be opened by gretl (an open source alternative to E views). (Source: Wikipedia, 2010).

Statistical Package for the Social Sciences (SPSS)

The SPSS was developed by postgraduate students of Stanford University in 1968. It is widely used in both academic and commercial circles. It provides a wide range of tools from basic tabulation to sophisticated multivariate analysis. The most recent version is release 16, is in the Windows format. Data can be entered directly into the package, or read from (and written to) Excel, Lotus and dBase files. Output can be printed directly, copied and pasted into Word or PowerPoint, or stored as an output file using the Output-Viewer facility in the package.

3.5.7 JUSTIFICATION FOR THE SOFTWARE USAGE

The study used Statistical Package for the Social Sciences (SPSS) as the main statistical software in analyzing the primary data. The SPSS software was selected over others because it is user-friendly and widely available. It is also the mostly used in both academic and commercial circles for analysing primary data. In view of its features, it is also expected to generate accurate results for the purpose of the study. The study involves complex analysis with cross tabulations, which requires bivariate and possibly multivariate analysis. It therefore needs fairly sophisticated software such as SPSS to do the complex analysis and produce reliable results.

The study again used Econometric views (E views) for the secondary data analysis because it is first and foremost user-friendly. It was again used because the work involved analysing data over a period of five years. The software also needed to collaborate with excels spread sheets for the extraction of the data.

3.5.8 DATA ANALYSIS MODEL

A prime systemic risk (S^1) will be derived based on probability and combinational analysis theorem of the three known and quantifiable risk factors. The quantifiable risk factors so far are: Credit Risk (C), Operational Risk (O) and Market Risk (M). The analysis will be based on the assumption that the determination of the quantifiable risk factors by the Basel are limited, in that, their interaction and relationships to the system as a whole are not factored in their evaluation. The "Risk Interactive Framework", however, assumes that the interaction of these quantifiable risk factors is deemed to contribute to a greater risk emanating from agency costs of the financial system associated with systemic risk.

Assumptions:

1. There are only four identifiable risk factors in the banking industry {S^1, C, and O& M}.

2. The interaction of three of the risk factors {C, O, and M} produces the fourth {S1}.
3. That three of the risk factors {C, O, and M} are given based on the framework of Basel II.
4. That the interaction of the three risk factors {C/O, M}; {O/M, C}; {M/O, C} is known.

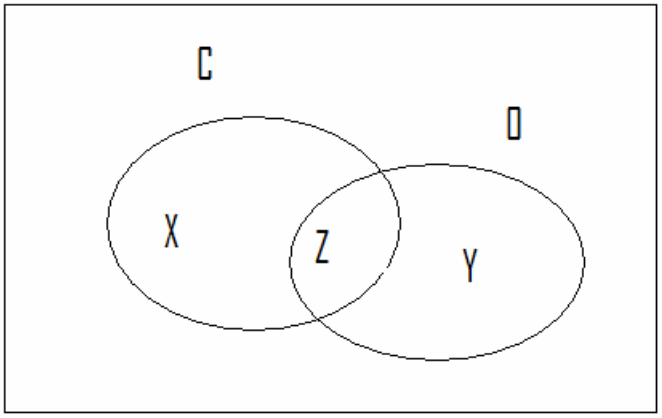
The Sets Theory

It is assumed that Prime Systemic Risk (S^1) is a combination of {C, O, and M}

(S^1)= Pr{C} +Pr {O} +Pr {M} = {C} U {O} U {M}

{C}U{O}U{M}= {C}+{O}+{M} - {CO}- {CM}-{OM}+ {COM}

Assuming we have only two risks, that is credit risk (C) and operational risks (O) as shown below:



The two risks as depicted by the sets theory are represented by Credit risk ‘C’ and ‘O’;

→ The constituents of the two risks are X, Y and Z

→ The interaction of the two risks produces Z whilst X and Y are unique to C and O respectively.

→ $C = X + Y$……..(1)

→ $O = Y + Z$……...(2)

→ $C \cup O = X + Y + Z$

→ but, $C \cap O = Z$ ……...(3)

→ $C \cup O = C + O - (C \cap O)$

→ $X + Z + Y + Z - Z$

→ $C \cup O = C + O - \{C \cap O\}$

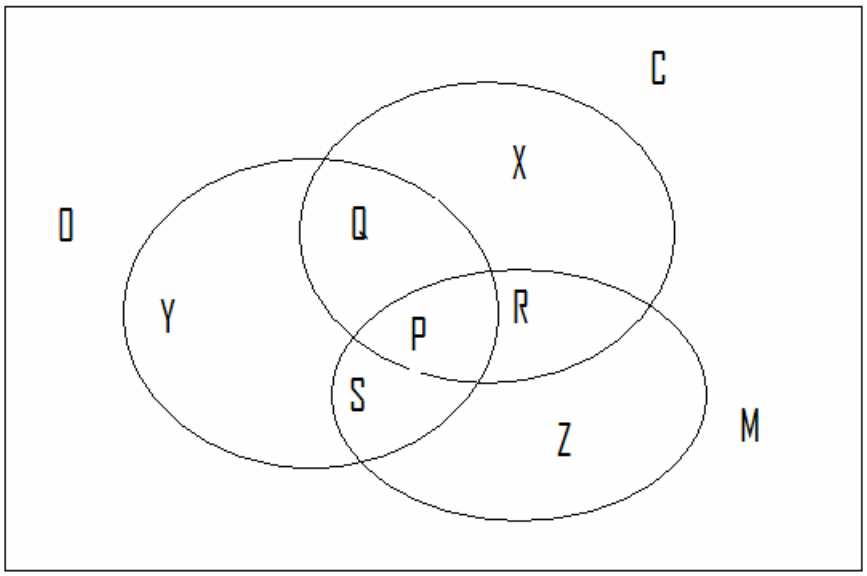
Where:

‘X’ represents elements peculiar to the contribution of Credit risks;

‘Z’ represents elements common to the contribution of both Credit risks and Operational risks; and

‘Y’ represents elements peculiar to the contribution of Operational risks.

Assuming the risks increased to three and where we have market risks (M) as the additional risk, we shall have the following:



Considering the above, we have:

→ C = X+Q+R+P……..(1)

→ O = Y+Q+S+P……..(2)

→ M = Z+R+S+P……..(3)

→ C ∩ O = Q+P……..(4)

→ C ∩ M=R+P……..(5)

→ O ∩ M=S+P……..(6)

→ C +O +M = X+Y+Z+Q+R+S+P

→ C + O+M = X+Y+Z+Q+Q+R+R+S+S+3P……(7)

→ (7) – {(4) + (5) + (6)}

→ = X+Y+Z+2Q+2R+2S+3P-Q-R-S-3P

→ = X+Y+Z+Q+R+S……(8)

→ but C ∩ O ∩ M = P…….(9)

→ (8)+(9)=X+Y+Z+Q+R+S+P…….(10)

→ (10)=C U O U M=C+O+M-{(C∩O)+(C∩M)+(O∩M)+C∩O∩M

Where:

'X' represents elements peculiar to the contribution of credit risks;

'R' represents elements which are common to the contribution of Credit risks and Market risks;

'S' represents elements which are common to the contribution of Operational risks and Market risks;

'Y' represents elements which are peculiar to the contribution of Operational risks;

'Q' represents elements which are common to the contribution of Operational risks and Credit risks; and

'P' represents elements common to all the risks.

In case of more than three (3) risks, say we have infinite risks represented by "n" we have:-

$$\cup_i^n A_i = \sum_{i=1}^{n} A_i - \sum_{i=1;k=2}^{n-1} A_i \cap A_k + \cap_{i=1}^{n} A_i$$

The above model shows that if we have an infinite number of risk elements depicted by (n), the union of those risks elements is a summation of all the risks less the summation of the intersection of the paired risk elements plus the intersection of all the risk elements.

3.6 QUANTITATIVE DATA PRESENTATION

Aside of analysing the qualitative data quantitatively, the study will obtain quantitative data from other secondary sources including information published or gathered by the Bank of Ghana. Quantitative data analysis is the main data analysis method to be employed for the study, and even qualitative data are to be

converted into pseudo quantitative data through codes and labels before being analyzed.

For instance the capital charges of credit, operational and market risks of all the 26 banks in Ghana as well as 3 non banks will be obtained. Secondly, the overlap of the various traditional risks charges will be determined to see the extent to which they interact. Thirdly the relationship of capital adequacy of the banking and non-bank industry to the country's GDP over a period of five years will also be determined to establish the cyclicality of the economy to the banking system and to see the extent to which regulators vary the capital adequacy of individual institutions due to their vulnerability as a result of changes in particular sectors of the economy. It will also seek to establish the relationship between the capital adequacy ratio (CAR) and the Non Performing Loans (NPL) ratio and the causality of changes in NPL to CAR and vice versa.

Secondary data will also be obtained from the audited accounts/annual reports as well as statutory returns of banks submitted to Bank of Ghana. Also data may be gathered from on-site & off-site reports of the Banking Supervision Department of the Bank of Ghana, accredited international, financial and business journals, the Banking Act of Ghana, 2002, Act 673, the non-bank financial institutions Act, Act 774, 2008, the Payment Systems Act (2003) Act 662, the Foreign Exchange Act (2006) Act 723, Credit Reporting Act, (2007), Act 726, the Lenders and Borrowers Act (2008) Act 773, Canadian Banking Act, Federal Deposit Insurance Act of the United States of America. The secondary data shall mainly be used to support the primary data obtained.

The study will seek to establish the extent to which the Bank of Ghana is empowered through the Bank of Ghana Act,2002 (Act 612) and the Banking Act, (2004) Act 673 as well as other legislation, to control various forms of financial risk. It will also seek to ensure how the Bank of Ghana seeks to ensure the integrity of the system.

The study will ensure that data is presented in a manner that will give sufficient meaning. Tables, graphs and charts will be used to present the data. Data on capital adequacy ratios, capital charges, balance sheets and NPLs of the banks as well as GDP of the economy of Ghana over a period of five years will be tabulated and presented in appropriate graphs. As noted by Stephen Few, 2005, "without guiding principles rooted in clear understanding of graph design choices are arbitrary and resulting communication fails in a way that can be costly to the business". The type of presentation is therefore important in making meaning out of data. Stephen Few 2005 further intimated that "to be complete and meaningful, quantitative information consists of both quantitative data-the numbers and categorical data-the labels which tell what the number measure". Data involving the trend of CAR and NPLs over the selected period will be depicted on line graphs whilst those involving proportions of capital charges may be depicted on histograms and bar or pie charts. Also where it is important to emphasize individual months to project seasonality then interval scales involving bar charts will particularly be used.

Balance Sheets of Banks in Ghana

The balance sheets of banks in Ghana have remained relatively less complex as banks have developed and engaged in less sophisticated products and transactions. The number of banks, especially with foreign parentage, has increased over the past few years. Due to the risk associated with the assets of the banks coupled with increased financial intermediation and as part of capital regulation banks in Ghana are required to increase their minimum capital to GH□60 million by the close 2010 (for foreign banks) and 2012 (for domestic banks). The constituents and the formula for capital adequacy ratio however remained intact. A five-year data of audited accounts of the banks will be displayed in tabular form for the purpose of data analysis of the study.

Capital Adequacy ratios of banks in Ghana

Capital adequacy ratio (CAR) which is the ratio of adjusted capital to adjusted assets would be computed and collated for a period of five years. The ratio is a charge for risk used by regulators which serves as a cushion against financial risk. The statutory capital adequacy ratio of the banking industry in Ghana is 10%. Monthly capital adequacy ratio collated for a period of five years would be displayed in tabular form for the purpose of the analysis of data of the study. In addition the capital adequacy ratio of non-banks will also be computed and displayed on monthly basis for the purpose of the analysis.

Capital risk charges of Banks in Ghana

This represents the monthly risks charges of credit, operational and market risks for a period of five years. The risk charges would be displayed in tabular form for the purpose of the analysis of data of the study.

Composite Non-Performing Loans ratio of Banks in Ghana

The Gross Non-Performing loans ratio will be computed monthly and displayed in tabular form for the purpose of the analysis of data of the study.

Ghana's Gross Domestic Products (GDP)

The Gross Domestic Products of the country for a period of five years will be obtained and displayed in tabular form for the purpose of the analysis of data of the study.

3.6.1 ERROR RATE

The survey tended to avoid total error rate by ensuring that it targeted practitioners and controllers as well as decision makers of risk management of fifteen out of the twenty six banks and the four largest non bank financial

institutions. There is thus the assurance that with this representation sampling error will be reduced to an appreciable level. The study also sought to reduce non response errors by making respectable and high ranking officers who are personally known to me responsible for the collection of the questionnaire. Again the questionnaires were made brief and clear. Errors associated with response rate such as researcher errors, interviewer errors and respondent errors were addressed by ensuring that adequate data was obtained. I am privileged to be working with the Bank Examination office of the Banking Supervision Department of the central bank of Ghana and therefore have sufficient access to crucial industry players and information on the industry. This to a large extent has minimised errors that would have been associated with the study.

3.7 LIMITATION

The research will limited to data collected from banks in Ghana as obtaining data from other jurisdiction might be very challenging. Interviews will also be restricted to two regulatory authorities in the Banking Supervision Department of the Bank of Ghana.

3.8 CHAPTER CONCLUSION

The research work seeks to ultimately address the difficulties associated with measuring and controlling systemic risks in the financial system based on the above methodologies. The methodologies have been carefully adopted to achieve the objectives of the study and ensure easy collection, analysis and presentation of data. Research is generally a balance of so many considerations to ensure that it achieves the intended purpose.

3.8.1 ETHICAL CONSIDERATIONS

The study is not meant to be used as a platform to vilify and harm others. The main consideration of the research is to solve a problem or to set the platform to solving a problem. Unethical research practices can severely damage the quality

of the research process, undermine the validity of the research findings and ultimately inflict serious damage upon the body of professional researchers. The study therefore sought to adopt the best of the techniques and methodology suitable for it. In so doing however, the ethics of generality of the professional researchers as well as the ethics peculiar to the institution are seriously considered. It is for this reason that I was formally admitted by the St. Clements University and the research topic as well as a proposal and an abstract of the research were approved by the University before the research was started. Per the principles enshrined in the University's code of conduct a candidate would be withdrawn if in the course of the research he is found to have done something unethical. The following have been catalogue by Colin Fisher et al, 2007 as some of the ethical issues and dilemmas in the field of research.

Negotiating access

Negotiating terms of reference with organisations: - If the research is about a project in a particular organisation it is often important to agree terms of reference for the project. The study also needs to ensure that the terms of reference give him/her an adequate scope to investigate the issues from a wide perspective as managements generally tend to have preferred solutions to the problems under study. Though this research is not a project about a particular organisation, the Bank of Ghana was informed for the use of the data which had been compiled by the Bank.

Right to privacy: - The study would endeavour to observe the privacy of respondents. Intrusion into the privacy and liberties of respondents could have a negative effect on the profession and even go a long way to mar the quality of the study.

Access to personnel records: - Where the study intrudes into the privacy in terms of personnel records of individuals, dual permission would be obtained from both the organisation and the individual concerned.

Confidentiality agreements: - The study would observe absolute confidentiality of respondents and organisations that have produce confidential information even

though it is the wish of the study to get the work published for it to be critiqued. However, the information for the study is not so confidential that would warrant the need to sign any confidentiality pact with the respondents and the organisations (Banks and non-bank financial institutions).

Informed consent: - Persons may not want to be participants or a source of information in a research project unless they have agreed to be so on the basis of a complete understanding of what their participation will involve and the purpose and use of the research. Informed consent may be implicit as the respondents, say, complete and return questionnaire. However, study made the consent explicit by including it on the face of the questionnaire to the effect that the respondents consent is obtained for filling and retuning the form.

Data collection stage

Unethical behaviours in research would be avoided even at the data collection stage. The study is thus mindful of the following:

Objectivity and disinterestedness: - The research will maintain its objectivity in outlining the theme and purpose of the research even in the midst of disinterestedness by the participant.

Deception: - Here again the purpose of the research was carefully explained to avoid deceiving the participants. Some sociological and psychological researchers such as Milgram's, 1963, who have used deception to research into the behaviour of persons may arguably justify deception based on the type of research and whether the actions produces results whose benefits outweighs the negative consequences. Other researchers including myself may however argue that despite the benefits anything obtained based on deception is unethical.

Confidentiality and anonymity: - Anonymity means changing the names and locations of informants and confidentiality means not revealing the sources. Study would be published data without disclosing the names of the banks and the institutions involved and this would be made clear to them.

Storage of data: - All researchers are required to comply with the Data Protection Act, 1998 which sets down some principles concerning the collection and use of personal information, which includes information about people's opinions as well as factual material such as age and sex and since it is the aim of the study to be published worldwide including the United Kingdom, it has sought to observe the Data Protection Act, 1998. The principles in the act are:

- Personal data shall be processed fairly and lawfully;
- Personal data shall be obtained only for one or more specified and lawful purposes, and shall not be further processed in any manner incompatible with that purpose or those purposes;
- Personal data shall be adequate, relevant and not excessive in relation to the purpose or purposes for which they are processed.
- Personal data shall be accurate and, where necessary, kept up to date.
- Personal data processed for any purpose or purposes shall not be kept for longer than is necessary for that purposes or those purposes.
- Personal data shall be processed in accordance with the rights of data subjects under the Act and this entitles a person to see any information that is held about them.

Appropriate technical and organisational measures shall be taken against unauthorised or unlawful processing of personal data and against accidental loss or destruction of, or damage to, personal data.

Personal data shall not be transferred to a country or territory outside the European Economic Area unless that country or territory ensures adequate level of protection for the rights and freedoms of data subjects in relation to the processing of personal data.

Practitioner/ researcher: - The study would take the precautions necessary when making sense of the research material. Richard Winter, 1989 has proposed a number of principles that can be applied when trying to find out what interpretations may be placed on research material as follows:

- Reflective critique: - Usually my findings may be coloured by my values, judgements and prejudices. That is, the accounts and judgements of the

study are usually bent back to focus on his internal concerns and preoccupations. The study would therefore have a reflexive critique to reconsider its values. (Van Maanen, 1988; Alvesson and Skoldberg, 2000).

- Dialectical critique: - The study would also do a dialectical analysis by looking for the contradictions and get them ironed out. For instance there are sometimes contradictions between the formal stated purposes of people's actions and their practice and impact. Thus to quote Winter, 1989, dialectical critique is thus "unity concealed behind apparent differentiation and contradiction concealed within apparent unity". It is therefore the contradictions between the formal unity of a thing and its teeming, detailed practical aspect. (Fisher et al, 2007).
- Collaborative resources: - The study has sought to look at an issue from the perspective of the perspective of the various stakeholders and involve them as resources in interpreting and understanding the research material. This may involve working with others in a collaborative group, or feeding back the material to others to gain their insights.
- Risk to one's own values: - The study such that the process would challenge my values and ways of looking at things. According to Fisher et al, 2007, the things at risk in particular, are:
    - The provisional interpretation of the research material by the study;
    - The decisions about the question at issue and what the research is about; and
    - The research plan, which may well have to change as the thinking of the study is challenged.
- Plural structure: - The study recognises that there are different perspectives on an issue. It therefore again recognises that there are different groups of stakeholders who may have different views and conclusions of the study.

- Theory, practice and transformation:- It is always been argued that just as practice needs to be challenged by theory, theory, on the other hand, needs to be challenged by practice. The study considers that the judgements and decisions made based on the study, if possible, would be tried in practice or at least be capable of being tested in practice.

The reporting stage

Misuse of research: - Just as the study would not be used to cause harm to those who cooperated (that is the organisations and persons who provided the information), in much the same way it will be more invidious when the report of the study is written such a way to please the sponsors because they expect it will be required of them. (Homan, 1991).

3.8.2 CONCLUSION

The research has sought to adopt the appropriate methodological techniques for the process of the study. This is manifested in choosing appropriate and best suited data collection methods, analysis approaches, data analysis software and above all conduct the research in the most efficient and ethical manner.

CHAPTER FOUR

4.0 DATA ANALYSIS AND INTERPRETATION

4.1 INTRODUCTION

The purpose of this chapter is to analyse the relationship of the primary and secondary data collected and collated for the purpose of the study and highlight the analysis made. It is also meant to analyse the data in relation to the research questions; to ensure that all the responses on the items addressing the research questions were collated and presented in frequency tables, bar charts and graphs; and after which simple percentages and means were used to analyse them. Data was also tested to either accept or reject the null hypothesis. All the hypotheses postulated were tested at 1%, 5% and 10% levels of significance using an appropriate test statistics for each type of data. The core primary data relating to the null hypothesis was tested using chi square test as the test statistic at 5% significance level.

4.2 PRIMARY DATA ANALYSIS

4.2.1 STATUS OF THE SURVEY

Positions of target population and categories of institutions

The survey targeted five senior management persons in the risk and other decision making levels of banks and non bank financial institutions as well as the regulators of the central bank. Fifteen out of twenty-six banks and four non banks were sampled for the study. The list of institutions is shown in appendix 1. Also frequency table showing the number and proportion of each selected institution is shown in table 1 below.

Table 4.1

BANKS OF SAMPLED INTERVIWEES

	BANKS	NATURE
1	GHANA COMMERCIAL BANK (GCB)	DOMESTIC
2	BARCLAYS BANK GHANA (BB)	FOREIGN
3	NATIONAL INVESTMENT BANK (NIB)	DOMESTIC
4	STANBIC BANK GHANA	FOREIGN
5	UT BANK	DOMESTIC
6	SAHEL SAHARA BANK (BSIC)	FOREIGN
7	CAL BANK	DOMESTIC
8	FIDELITY BANK (FBL)	DOMESTIC
9	HFC BANK	DOMESTIC
10	INTERCONTINENTAL BANK	FOREIGN
11	THE TRUST BANK (TTB)	DOMESTIC
12	UNITED BANK FOR AFRICA (UBA)	FOREIGN
13	UniBANK	DOMESTIC
14	ZENITH BANK	FOREIGN
15	PRUDENTIAL BANK	DOMESTIC
	NON BANKS	
1	UT FINANCIAL SERVICES	DOMESTIC
2	CITY INVESTMENTS COMPANY	DOMESTIC
3	PROCREDIT SAVINGS AND LOANS	FOREIGN
4	EXPRESS SAVINGS AND LOANS CO. LTD	DOMESTIC

The entire research questionnaire was administered to one hundred and thirty (130) financial risk professionals and decision makers from fifteen institutions comprising banks and non-bank financial institutions. Out of the one hundred and thirty selected persons, ninety-seven (97) of them responded. This constituted about seventy-five percent (75%) and considered statistically representative of the population.

Table 4.2

Indicate the type of your institution

	Frequency	Percent	Valid Percent	Cumulative Percent
BOG	1	1.0	1.0	1.0
Banking	75	77.3	77.3	78.4
DTNonBAnk	15	15.5	15.5	93.8
NDTNBFI	6	6.2	6.2	100.0
Total	97	100.0	100.0	

Source: primary survey results of the study

The above table shows that in all 97 responded to the questionnaire. One person from the central Bank of Ghana (Head, Banking Supervision Department), seventy-five persons or (77.3%) from banking institutions, fifteen or (15.5%) from deposit taking non-bank financial institutions and six or (6.2%) from non-deposit non-bank financial institutions responded to the questionnaire.

Nature of the institutions

Table 4.3

What form does your institution take

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Foreign	42	43.3	43.3	43.3
	Local	54	55.7	55.7	99.0
	BOG	1	1.0	1.0	100.0
	Total	97	100.0	100.0	

Source: primary survey results of the study

Forty-two respondents or 43.3% of the respondents belong to foreign institutions and fifty-four or 55.7% respondents from domestic or local banks, whilst one or the 1% is from the central bank (Bank of Ghana).

Function and vocations of respondents

Table 4.4

What is your position or role

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	CEO	12	12.4	12.4	12.4
	Risk Manager	14	14.4	14.4	26.8
	Compliance Officer	14	14.4	14.4	41.2
	CFO/FC	4	4.1	4.1	45.4
	Others	23	23.7	23.7	69.1
	Head, Treasury	10	10.3	10.3	79.4
	Head, Credit, Corporate, SMEs	7	7.2	7.2	86.6
	General Managers	6	6.2	6.2	92.8
	Deputy CEO	5	5.2	5.2	97.9
	Head, Internal Audit	2	2.1	2.1	100.0
	Total	97	100.0	100.0	

Source: primary survey results of the study

The above frequency table analyses the status, functions and vocations of the respondents. The survey largely targeted senior risk management personnel and (or) decision makers of the financial institutions. The survey therefore specified categories of persons and position to respond to the questionnaire. Seventy-four persons or 76.3% of the targeted vocations or functions responded to the questionnaire. The risk and compliance officers together constitute the highest proportion of persons who responded. Together they constitute about 28 or 28.8% of the total respondents. The Chief Executive Officers and the treasury officers followed closely with 12.4% and 7.2% respectively. Again the Deputy CEOs and the General Managers together constitute about 11.4%. The table thus shows that

the survey was largely responded to by the target group. The expected credibility of the results is therefore likely to be achieved.

Length of positions held by respondents

Table 4.5

How long have you been in this position

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below one year	22	22.7	22.7	22.7
	One to three years	36	37.1	37.1	59.8
	over three years	39	40.2	40.2	100.0
	Total	97	100.0	100.0	

Source: primary survey results of the study

The table shows most or thirty-nine persons or 40.2% of respondents had held their positions for over three years and the least, involving 22 persons or 22.7% of them have held their positions for less than one. This reinforces the earlier deduction that the credibility of the results would be enhanced since more experienced persons responded to the questionnaire.

Market share of institutions

Table 4.6

Where will you place your institution in the industry in terms of market share

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-3	36	37.1	37.5	37.5
	4-10	32	33.0	33.3	70.8
	11-15	22	22.7	22.9	93.8
	Over 15	6	6.2	6.2	100.0
	Total	96	99.0	100.0	
Missing	System	1	1.0		
Total		97	100.0		

Source: primary survey results of the study

The table shows that thirty-six persons or 37.1% of the target group considered their institutions as having a very good market share of the industry, be it banks or non banks. The table also shows that the bulk involving 67.1% were in the 1-10 bracket of the industry. This means that the banks and institutions that the survey targeted were sufficiently large to have the structure and framework for risk and risk management.

Table 4.7

Do you have a risk management department/unit

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	85	87.6	87.6	87.6
	No	12	12.4	12.4	100.0
	Total	97	100.0	100.0	

Source: primary survey results of the study

This table shows that 85 persons or 87.6% of the respondents have risk management departments or units. This means that most banks or institutions have, at least, the minimum risk management structure and framework.

Table 4.8

If no, why

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not relevant	1	1.0	10.0	10.0
	Relevant, work in progress	9	9.3	90.0	100.0
	Relevant, no expertise	87	89.7	100.0	
Total		97	100.0		

Source: primary survey results of the study

Table 4.10

If yes how effective is the department

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very effective	67	69.1	77.0	77.0
	Barely effective	19	19.6	21.8	98.9
	Not effective	1	1.0	1.1	100.0
	Total	87	89.7	100.0	
Missing	System	10	10.3		
Total		97	100.0		

Source: Primary survey results of the study.

The above table shows that only 1 person or one percent thought a risk management department or unit is not relevant in his department. Ninety-six persons or 99.0% of the respondents were of the view that risk management is relevant. Out of the 99.0%, 9.3% were in the process of establishing the structure or framework for risk management departments or units.

Source: primary survey results of the study

The table shows that of the respondents' 67 persons or 69.1% claimed they had very effective risk management departments or units. Nineteen persons or 19.6% said their risk management department is barely effective. The results of the study in the frequency tables 5 to 8 indicate that most of the institutions appreciate and practice risk management and even those who do not practice it are in the process of putting the structure and the framework in place.

Table 4.11

Systemic risk has become a very topical issue in financial industry in recent years

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	56	57.7	57.7	57.7
	Agree	37	38.1	38.1	95.9
	Neutral	4	4.1	4.1	100.0
	Total	97	100.0	100.0	

Source: primary survey results of the study

The survey shows that 56 persons or 57.78% strongly agree that system risk has become topical in the financial industry in recent times. 37 or 38.1% only agree without a degree of emphasis that systemic risk has become topical in recent times. This means that 93 persons or 94.8% of the respondents agree that systemic risk has become newsworthy and relevant in recent times. It again means that the majority of the respondents considered the research as very important and relevant for the industry.

Table 4.12

Separate identification, measurement and control of systemic risk amongst financial institutions is crucial

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	43	44.3	44.3	44.3
	Agree	49	50.5	50.5	94.8
	Neutral	2	2.1	2.1	96.9
	Disagree	3	3.1	3.1	100.0
	Total	97	100.0	100.0	

Source: primary survey results of the study

The survey shows that 92 persons or 94.8% are in agreement that separate identification, measurement and control or systemic risk is crucial for effective measurement and control of the risks in the financial system. 3 persons or 3.1%

disagreed to the statement, whilst 2 or 2.1% are just neutral. This means the vast majority of the respondents appreciate at least rudimentary risk management procedures that must be employed to identify and manage risk.

Table 4.13

A separate charge should be made for systemic risk by the capital adequacy framework

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	17	17.5	17.5	17.5
	Agree	51	52.6	52.6	70.1
	Neutral	21	21.6	21.6	91.8
	Disagree	8	8.2	8.2	100.0
	Total	97	100.0	100.0	

Source: primary survey results of the study

On the question as to whether a separate charge is to be made for systemic risk through the capital adequacy framework 68 persons or 70.1% of the respondents were in agreement with the statement, whilst seventeen (17) respondents or 17.5% among those who agree were strongly in agreement. Only 8 persons or 8.2% of the respondents disagreed with the statement. Twenty-one (21) persons or 21.6% of the respondents were neutral. This means that a vast majority of the respondents consider the Capital Adequacy Ratio (CAR) framework as an appropriate framework for making a charge for systemic risk in the Ghanaian financial system.

Table 4.14

Financial institutions should include capital charge of systemic risk based on their systemic importance to the financial system

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	21	21.6	21.6	21.6
	Agree	44	45.4	45.4	67.0
	Neutral	22	22.7	22.7	89.7
	Disagree	10	10.3	10.3	100.0
	Total	97	100.0	100.0	

Source: primary survey results of the study

The results of the primary data shows that sixty-five (65) persons or 67% of the respondents would want capital charge of systemic risk to be based on the systemic importance of the banks. Twenty-two persons (22) or 22.7% of the respondents were neutral, while ten (10) or 10.3% of the respondents disagreed to the statement. This means that systemic importance of institutions is found to very crucial when determining systemic risk and capital charge to be appropriated.

Table 4.15

Most non-deposit taking financial institutions develop products similar to their counterparts in the deposit taking category

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	18	18.6	18.6	18.6
	Agree	66	68.0	68.0	86.6
	Neutral	8	8.2	8.2	94.8
	Disagree	5	5.2	5.2	100.0
	Total	97	100.0	100.0	

Source: primary survey results of the study

The survey results show that eighteen (18) persons or 18.6% of the respondents do strongly agree that non deposit taking financial institutions develop products similar to their counterparts in the deposit taking category and banks. Sixty-six (66) persons or 68% of the respondents were also just in agreement without any degree of emphasis. Meaning seventy-four (74) persons or 86.6% of the respondents agree to the assertion, whilst only five (5) or 5.2% disagree. Eight (8) persons or 8.2% of respondents were neutral to the assertion. This clearly indicates that a vast majority of the respondents subscribe to the assertion.

Table 4.16

Capital charge (CAR) for risk should be extended to other non-bank financial institutions, whether deposit taking or non deposit taking

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	23	23.7	23.7	23.7
	Agree	60	61.9	61.9	85.6
	Neutral	10	10.3	10.3	95.9
	Disagree	4	4.1	4.1	100.0
	Total	97	100.0	100.0	

Source: primary survey results of the study

The survey results of the above frequency table shows that twenty-three (23) persons or 23.7% of the respondents were strongly of the opinion that capital charge should be extended to other non bank financial institutions, whether they are deposit taking institutions or not, whilst sixty (60) persons or 61.9% of them just agreed to the assertion. This means that in total eighty-three (83) persons or 95.6% of the respondents do support the assertion. Ten (10) persons or 10.3% of the respondents were indifferent, whilst only four (4) or 4.1% of them disagreed completely with the assertion.

Table 4.17

Credit, operational and market risk factors are interrelated

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	44	45.4	45.4	45.4
	Agree	52	53.6	53.6	99.0
	Disagree	1	1.0	1.0	100.0
	Total	97	100.0	100.0	

Source: primary survey results of the study

The above survey results show that forty-four (44) persons or 45.4% of the respondents were strongly in the agreement of the assertion that credit, operation and market risks are interrelated. Fifty-two (52) persons or 53.6% of them just agreed to the assertion and only one (1) person or 1% completely disagreed. This means that ninety-six (96) persons or 99.0% of the respondents agreed to the assertion. The position supports the hypotheses of the study.

Table 4.18

Complexity and sophistication of financial institution reflect in the current computation (framework) of capital charge

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	17	17.5	17.5	17.5
	Agree	48	49.5	49.5	67.0
	Neutral	13	13.4	13.4	80.4
	Disagree	19	19.6	19.6	100.0
	Total	97	100.0	100.0	

Source: primary s

The above table shows that seventeen (17) people or 17.5% of the respondents' strongly agreed to the assertion that the current capital adequacy framework reflects how complex and sophisticated the financial institutions are. Forty-eight (48) persons or 49.5% of the respondents simply agreed that the framework

captures the complexity and the sophistication of the operations of the institutions. Thirteen (13) persons or 13.4% were neutral to the assertion, whilst 19 persons or 19.6% were not in agreement with the assertion. This means the vast majority of the respondents were in agreement with the assertion and thus defies the hypotheses of the study.

Table 4.19

Banks should be allowed to fail irrespective of the extent of risks they pose to the system if they take bad decisions

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	5	5.2	5.2	5.2
	Agree	17	17.5	17.5	22.7
	Neutral	19	19.6	19.6	42.3
	Disagree	56	57.7	57.7	100.0
	Total	97	100.0	100.0	

Source: primary survey results of the study

The survey results show that only five (5) or 5.2% of the respondents were strongly in agreement with the assertion that banks should be allowed to fail irrespective of the extent of risk they pose to the financial system. Moving a step further shows that seventeen (17) persons or 17.5% of the respondents agreed to the assertion and nineteen (19) or 19.6% were neutral. This means that fifty-six (56) persons or 57.7% were not in agreement with the assertion. The results therefore largely support the hypothesis.

Table 4.20

Source: primary s

Banks and other financial institutions should be rescued with the tax payers' money to prevent them from failing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	4	4.1	4.1	4.1
	Agree	28	28.9	28.9	33.0
	Neutral	32	33.0	33.0	66.0
	Disagree	33	34.0	34.0	100.0
	Total	97	100.0	100.0	

The survey statistics show that only four (4) persons or 4.1% of the respondents strongly agreed to the assertion that banks and other financial institutions should be rescued with the tax payers' money to prevent them from failing. Twenty-eight (28) persons or 28.9% only agreed to the assertion, meaning thirty-two (32) persons or 33% of the respondents supported the assertion. Thirty-three (33) persons or 34% of the respondents disagreed with the assertion, whilst thirty-two (32) persons or 34% of them were indifferent. This means that not too many people will feel comfortable if public funds were used to rescue banks in distress. It also presupposes that either banks or institutions should be allowed to fail or alternative sources of rescue funds should be employed to salvage banks in distress.

Table 4.21

Financial institutions should create a fund to rescue themselves in case of any eventuality

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	15	15.5	15.5	15.5
	Agree	48	49.5	49.5	64.9
	Neutral	18	18.6	18.6	83.5
	Disagree	16	16.5	16.5	100.0
	Total	97	100.0	100.0	

Source: primary survey results of the study

The above survey results show that sixty-three (63) persons or 65% of the respondents were generally in agreement with the assertion that banks or financial institutions should create funds to rescue themselves when they are in distress, with fifteen (15) or 15.5% of them strongly agreeing to the assertion. Eighteen (18) or 18.6% of them were indifferent whilst sixteen (16) persons or 16.5% of them completely disagreed with the assertion. The results of this assertion in conjunction with the results of the immediate past assertion of Table 20, means that the respondents will be more comfortable if banks or institution create their own funds to rescue themselves and therefore agree with the hypotheses that a charge must be made cater for systemic risk.

Table 4.22

Capital charge for systemic risk could prevent banks and other financial institutions from becoming systemically important

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	1	1.0	1.0	1.0
	Agree	37	38.1	38.1	39.2
	Neutral	25	25.8	25.8	64.9
	Disagree	33	34.0	34.0	99.0
	34	1	1.0	1.0	100.0
	Total	97	100.0	100.0	

Source: primary survey results of the study

The above survey frequency table shows that only one (1) person or 1% of the respondents strongly agreed to the assertion that capital charge for systemic risk could prevent banks and other financial institutions from becoming systemically important. Thirty-seven (37) or 38.1% of them just agreed to the assertion. Twenty-five or 25.8% were neutral, whilst thirty-three or 34% simply disagreed. This means that even though the respondents who supported the assertion were in the majority they did not have a clear urge as the pendulum could sway any where if the neutral positions were subjected to further analysis.

Table 4.23

Capital charge for systemic risk could prevent financial institutions from failing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	5	5.2	5.2	5.2
	Agree	31	32.0	32.0	37.1
	Neutral	21	21.6	21.6	58.8
	Disagree	40	41.2	41.2	100.0
	Total	97	100.0	100.0	

Source: primary survey results of the study

The above frequency table of the survey results shows that five (5) persons or 5.2% of the respondents strongly agreed to the assertion that capital charge for systemic risk could prevent banks and other financial institutions from failing, whilst thirty-one (31) or 32% of them simply agreed without any degree of emphasis. Twenty-one (21) or 21.6% of them were indifferent, whilst forty (40) persons of 41.2% disagreed with the assertion. This means that was a split among the respondents as to whether capital charge for system risk in itself could prevent banks from failing.

Table 4.24

Systemic charge should be a fixed or general charge to financial institutions irrespective of their size and complexity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	2	2.1	2.1	2.1
	Agree	26	26.8	26.8	28.9
	Neutral	16	16.5	16.5	45.4
	Disagree	53	54.6	54.6	100.0
	Total	97	100.0	100.0	

Source: primary survey results of the study

The above survey results depicted in the frequency table shows that only two (2) persons or 2.1% of the respondents strongly agree to the assertion that systemic

charge should be a fixed or general charge to financial institutions irrespective of their size and complexity, whilst twenty-six (26) persons or 26.8% of them simply agreed without any degree of emphasis. Meaning those who agreed to the assertion are only twenty-eight (28) persons or 28.9%. Sixteen (16) persons or 16.5% were indifferent to the assertion, whilst fifty-three (53) or 54.6% of them simply disagreed with the assertion. This means that the respondents were simply not in agreement with the assertion that systemic risk should be a fixed and general charge to all the institutions. It is therefore in agreement with the status quo or the null hypotheses of the study.

Table 4.25

Systemic charge should be a specific charge to individual financial institutions to reflect their size and complexity of operations

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	23	23.7	23.7	23.7
	Agree	59	60.8	60.8	84.5
	Neutral	12	12.4	12.4	96.9
	Disagree	3	3.1	3.1	100.0
	Total	97	100.0	100.0	

Source: primary survey results of the study

The above survey results depicted in the frequency table shows that twenty-three (23) persons or 23.7% of the respondents strongly agree to the assertion that systemic charge should be a specific charge to individual financial institutions in order to reflect their size and complexity of operations. Fifty-nine (59) persons or 60.8% of the respondents simply agreed to the assertion without any degree of emphasis. Twelve (12) persons or 12.4% were neutral whilst only three (3) or 3.1% disagreed to the assertion. This means that a vast majority (84.5%) of the respondents are of the view that systemic charge should be specific to individual

institutions and thus underscores the opinion expressed in the preceding question posed. It also strongly supports the null hypotheses of the study.

Table 4.26

Determination and incorporation of capital charge for systemic risk would make the capital adequacy prescription of Basel II more conservative

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	4	4.1	4.1	4.1
	Agree	61	62.9	62.9	67.0
	Neutral	19	19.6	19.6	86.6
	Disagree	13	13.4	13.4	100.0
	Total	97	100.0	100.0	

Source: primary survey results of the study

The results of frequency table 24.0 shows that whilst only four (4) persons or 4.1% of the respondents strongly agreed to the assertion that "determination and incorporation of capital charge for systemic risk would make the capital adequacy prescription of Basel II more conservative", sixty-one (61) or 62.9% of them simply agreed to the assertion without any degree of emphasis. Thus in all sixty-five (65) or 67% of the respondents are in agreement with the assertion. Only thirteen (13) or 13.4% disagreed outright. The results on the whole show that majority (65.0%) of the respondents are in agreement with the assertion. The results of the assertion therefore clearly demonstrates that industry players, involving professionals and highly technical staff, are of the view that Pillar one of the Basel II framework could be made more conservative and risk sensitive by introducing capital charge for systemic risk in the framework.

Table 4.27

The CAR (Capital Adequacy Ratio) framework should directly incorporate the measurement of such important risk as systemic risk

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	14	14.4	14.4	14.4
	Agree	62	63.9	63.9	78.4
	Neutral	9	9.3	9.3	87.6
	Disagree	12	12.4	12.4	100.0
	Total	97	100.0	100.0	

Source: primary survey results of the study

The survey results of the above assertion that "the capital adequacy ratio (CAR) framework should directly incorporate the measurement of systemic risk" show that fourteen (14) persons or 14.4% of the respondents were strongly in agreement with the assertion. Sixty- two (62) persons or 63.9% of them simply agreed without any degree of emphasis. Whilst nine (9) persons or 9.3% of the respondents were indifferent to the assertion, twelve (12) persons or 12.4% of them simply disagreed with the assertion. This means that the vast majority (76%) of the respondents were in agreement with the assertion. The above results in conjunction with the results of the immediately preceding table (table 25) clearly demonstrates that industry players would want the capital adequacy framework to be made more conservative and risk sensitive by including systemic risk.

Table 4.28

The derivative market in Ghana should be highly regulated irrespective of whether it is used for hedging or for speculative purposes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	38	39.2	39.2	39.2
	Agree	48	49.5	49.5	88.7
	Neutral	11	11.3	11.3	100.0
	Total	97	100.0	100.0	

Source: primary survey results of the study

The survey results of the assertion that shows that none of the respondents disagreed with the assertion. Thirty-eight (38) persons or 39.2% of the respondents strongly agreed with the assertion, forty-eight (48) persons or 49.5% simply agreed with the assertion. This means that over 88% of the respondents agreed with the assertion, whilst 11.3% were just indifferent. This means that the respondents were almost unanimous in their opinion that the derivative market in Ghana must be regulated.

Table 4.29

What form does your institution take * Do you have a risk management department/unit Cross tabulation

Count				
		Do you have a risk management department/unit		
		Yes	No	Total
What form does your institution take	Foreign	41	1	42
	Local	44	10	54
	4.00	0	1	1
Total		85	12	97

Source: primary survey results of the study

The above cross tabulation results show that forty-one (41) out of the forty-two (42) foreign firms respondents had risk management departments or units and

forty-four (44) out of fifty-four (54) domestic firms had risk management departments or units as well. This means that foreign financial institutions in Ghana are more risk conscious, than the local financial institutions. The twelve (12) who did not have risk management departments or units all belong to non bank financial institutions with the exception of one (1) person who is a bank regulator from the central bank.

Table 4.30

What form does your institution take * If yes how effective is the department Cross tabulation

		If yes how effective is the department			Total
		Very effective	Barely effective	Not effective	
What form does your institution take	Foreign	31	10	1	42
	Local	36	9	0	45
Total		67	19	1	87

Source: primary survey results of the study

The results again show that out of the forty-two (42) persons of foreign firms, thirty-one (31) said their risk management units or departments were very effective, ten (10) said they were barely effective, whilst only one (1) said his was ineffective. Again with respect to the persons from local firms, thirty-six (36) out of forty-five (45) of them said they have a very effective risk management department/unit, nine (9) persons said the units were barely effective, whilst none (0) said they had an ineffective risk management unit. This means that both Foreign and Domestic firms have taken risk management seriously. This could again be attributed to the efforts put in place by the Central Bank for all banks in the country establish a risk management department or unit to be manned by well trained staff. The idea was not only to ensure that banks started identifying and measuring their risks properly, but to serve as a precursor to adopting Basel II in 2011.

Table 4.31

What is your position or role * Banks should be allowed to fail irrespective of the extent of risks they pose to the system if they take bad decisions Cross tabulation

		Banks should be allowed to fail irrespective of the extent of risks they pose to the system if they take bad decisions				Total
		Strongly agree	Agree	Neutral	Disagree	
What is your position or role	CEO	4	2	2	4	12
	Risk Manager	0	3	3	8	14
	Compliance Officer	0	2	3	9	14
	CFO/FC	0	0	0	4	4
	Others	0	3	3	17	23
	Head, Treasury	0	2	3	5	10
	Head, Credit, Corporate, SMEs	1	2	2	2	7
	General Managers	0	1	2	3	6
	Deputy CEO	0	2	1	2	5
	Head, Internal Audit	0	0	0	2	2
Total		5	17	19	56	97

Source: primary survey results of the study

The above results of relating the roles or positions of the respondents to whether "banks should be allowed to fail irrespective of the extent of risk they pose to the system if they take bad decisions" show that fifty-six (56) persons or 57.7% respondents disagreed with the assertion, nineteen (19) persons or 19.6% were neutral, seventeen persons (17) agreed, whilst only five (5) strongly disagreed to the assertion. Again analysing further it is clear that the Compliance and the Risk Management Officers were the most opponents of the assertion. Considering identifiable groups, the two groups recorded nine (9) and (8) persons respectively and these constitute the highest among the groups. The reason is that the two groups are the most knowledgeable of risk and its implications in the financial world. The results generally support the argument and the null hypothesis that some banks cannot be allowed to fail because they are too big to fail.

Table 4.32

What is your position or role * Systemic charge should be a fixed or general charge to financial institutions irrespective of their size and complexity Cross tabulation

Count						
		Systemic charge should be a fixed or general charge to financial institutions irrespective of their size and complexity				Total
		Strongly agree	Agree	Neutral	Disagree	
What is your position or role	CEO	1	3	2	6	12
	Risk Manager	0	4	5	5	14
	Compliance Officer	0	2	2	10	14
	CFO/FC	1	2	0	1	4
	Others	0	6	5	12	23
	Head, Treasury	0	4	1	5	10
	Head, Credit, Corporate, SMEs	0	3	1	3	7
	General Managers	0	0	0	6	6
	Deputy CEO	0	0	0	5	5
	Head, Internal Audit	0	2	0	0	2
Total		2	26	16	53	97

Source: primary survey results of the study

The above results show that fifty-three (53) out of ninety-seven (97) respondents disagreed with the assertion that "systemic charge should be a fixed or general charge to financial institutions irrespective of their size and complexity". Again, from this it is clear that the Compliance and Risk managers were the highest scored among the identifiable groups who disagreed with the assertion. Also the CEOs, the General Managers and the Deputy CEOs almost disagreed in unison. This may be attributed to their deep understanding of the question and its implication. The results therefore support the hypothesis that systemic charge should be made based on the systemic importance of banks.

Table 4.33

What is your position or role * Capital charge for systemic risk could prevent financial institutions from failing Cross tabulation

Count

		Capital charge for systemic risk could prevent financial institutions from failing				Total
		Strongly agree	Agree	Neutral	Disagree	
What is your position or role	CEO	2	3	4	3	12
	Risk Manager	1	5	2	6	14
	Compliance Officer	0	3	3	8	14
	CFO/FC	2	0	1	1	4
	Others	0	14	2	7	23
	Head, Treasury	0	1	5	4	10
	Head, Credit, Corporate, SMEs	0	2	1	4	7
	General Managers	0	0	2	4	6
	Deputy CEO	0	2	1	2	5
	Head, Internal Audit	0	1	0	1	2
Total		5	31	21	40	97

Source: primary survey results of the study

The results of the above assertion show that thirty-five (35) persons out of ninety-seven (97) agreed with the assertion with five (5) emphasizing the degree of agreement. However, forty (40) persons disagreed with the assertion. Again the highest identifiable groups that disagreed with the assertion were the Risk and Compliance Managers recording six (6) and eight (8) persons respectively. Again this because of their deep understanding of risk in the financial system and for that matter, their appreciation that fact the prevention of the totality of risk in the financial system are important in salvaging banks.

Table 4.34

What is your position or role * Systemic charge should be a specific charge to individual financial institutions to reflect their size and complexity of operations Cross tabulation

Count

		Systemic charge should be a specific charge to individual financial institutions to reflect their size and complexity of operations				
		Strongly agree	Agree	Neutral	Disagree	Total
What is your position or role	CEO	4	5	3	0	12
	Risk Manager	3	10	1	0	14
	Compliance Officer	5	9	0	0	14
	CFO/FC	2	1	0	1	4
	Others	7	14	2	0	23
	Head, Treasury	1	6	2	1	10
	Head, Credit, Corporate, SMEs	0	4	3	0	7
	General Managers	0	6	0	0	6
	Deputy CEO	0	4	0	1	5
	Head, Internal Audit	1	0	1	0	2
Total		23	59	12	3	97

Source: primary survey results of the study

The above survey frequency table shows that eighty-two out of ninety-seven (97) persons (84.5%) agreed to the assertion that "systemic charge should be a specific charge to individual financial institutions to reflect their size and complexity of operations", with only three (3) persons disagreeing and twelve (12) were indifferent. Nine (9) out of twenty (12) CEOs agreed with no disagreement. Three (3) of them were however indifferent to the question. Again thirteen (13) out fourteen (14) Risk Managers agreed to the assertion with no disagreement. All the six (6) General Managers agreed to the assertion. Also all the fourteen (14) compliance managers agreed to the assertion. The results show that all the risk sensitive managers and indeed the generality of the people are in agreement with the assertion and therefore support the research objective that systemic risk should be effectively measured based on the firms systemic importance and should be

done through the capital adequacy framework. This result strongly supports the hypotheses of the study.

Table 4.35

What is your position or role * The CAR (Capital Adequacy Ratio) framework should directly incorporate the measurement of such important risk as systemic risk Cross tabulation

Count

		The CAR (Capital Adequacy Ratio) framework should directly incorporate the measurement of such important risk as systemic risk				
		Strongly agree	Agree	Neutral	Disagree	Total
What is your position or role	CEO	2	8	1	1	12
	Risk Manager	1	10	2	1	14
	Compliance Officer	4	7	0	3	14
	CFO/FC	2	1	0	1	4
	Others	4	17	0	2	23
	Head, Treasury	0	5	3	2	10
	Head, Credit, Corporate, SMEs	0	5	0	2	7
	General Managers	1	4	1	0	6
	Deputy CEO	0	3	2	0	5
	Head, Internal Audit	0	2	0	0	2
Total		14	62	9	12	97

Source: primary survey results of the study

The above frequency table shows that seventy-six (76) persons or 78.4% of the respondents agreed to the assertion that "the Capital Adequacy Ratio (CAR) framework should directly incorporate the measurement of systemic risk". Out of twelve CEOs who answered the question, only one (1) disagreed with the assertion. Again out of fourteen (14) Risk Managers only one (1) disagreed. Three (3) out of the fourteen (14) Compliance Officers disagreed to the assertion, whilst

none of the General Managers, the Deputy CEO and the Internal Auditor disagreed to the assertion. The results of the primary data gathered therefore support the research objective and the hypothesis of the study.

Table 4.36

What is your position or role * Complexity and sophistication of financial institution reflect in the current computation of capital charge Cross tabulation

Count

		Complexity and sophistication of financial institution reflect in the current computation of capital charge				
		Strongly agree	Agree	Neutral	Disagree	Total
What is your position or role	CEO	2	7	2	1	12
	Risk Manager	4	7	0	3	14
	Compliance Officer	3	5	1	5	14
	CFO/FC	0	3	1	0	4
	Others	1	12	6	4	23
	Head, Treasury	3	5	2	0	10
	Head, Credit, Corporate, SMEs	1	5	0	1	7
	General Managers	2	2	0	2	6
	Deputy CEO	1	1	1	2	5
	Head, Internal Audit	0	1	0	1	2
Total		17	48	13	19	97

Source: primary survey results of the study

The above frequency table of the survey results show that sixty-five (65) persons or 67.0% agreed to the assertion that "the complexity and sophistication of financial institutions reflect in the current capital adequacy computation". Out of the nineteen whom disagreed five (5) were compliance Officers, one (1) was a CEO and the rest are dispersed among the other positions. However none of the CFOs disagreed. This may be as a result of their direct involvement in the computation of the CAR for the institutions.

Table 4.37

What is your position or role * Financial institutions should create a fund to rescue themselves in case of any eventuality Cross tabulation

Count

		Financial institutions should create a fund to rescue themselves in case of any eventuality				
		Strongly agree	Agree	Neutral	Disagree	Total
What is your position or role	CEO	2	8	1	1	12
	Risk Manager	2	9	1	2	14
	Compliance Officer	2	8	1	3	14
	CFO/FC	2	1	0	1	4
	Others	5	10	5	3	23
	Head, Treasury	2	2	3	3	10
	Head, Credit, Corporate, SMEs	0	4	3	0	7
	General Managers	0	2	2	2	6
	Deputy CEO	0	3	1	1	5
	Head, Internal Audit	0	1	1	0	2
Total		15	48	18	16	97

Source: primary survey results of the study

The above results per the frequency table show that sixty-three (63) persons or 65.0% of the respondents agreed to the assertion that "banks and other financial institution should create a fund to rescue themselves in case of any eventuality". Sixteen (16) persons or 16.5% of the respondents disagreed with the assertion and eighteen (18) or 18.6% were indifferent. Ten (10) out of the twelve (12) CEOs agreed to the assertion, eleven (11) out of the fourteen (14) risk managers agreed to the assertion, ten (10) out of the fourteen (14) compliance officers also agreed to the assertion. It is clear that majority of all the identifiable groups or positions agreed to the assertion. The results suggest that respondents in all the risk

sensitive positions subscribe to the assertion and indirectly disagree to the assertion that banks and other financial institutions should be allowed to fail. The results therefore strongly support the null hypotheses of the study.

RESULTS OF CHI SQUARE TEST

Table 4.38

A separate charge should be made for systemic risk by the capital adequacy framework

	Observed N	Expected N	Residual
Strongly agree	17	24.2	-7.2
Agree	51	24.2	26.8
Neutral	21	24.2	-3.2
Disagree	8	24.2	-16.2
Total	97		

Source: primary survey results of the study

The above confirms the frequency tables as a as net positive residual of 19.6 was obtained in favour of the assertion.

Table 4.39

Financial institutions should include capital charge of systemic risk based on their systemic importance to the financial system

	Observed N	Expected N	Residual
Strongly agree	21	24.2	-3.2
Agree	44	24.2	19.8
Neutral	22	24.2	-2.2
Disagree	10	24.2	-14.2
Total	97		

Source: primary survey results of the study

The net residual was 16.6 of observed values over the expected values in favour of the assertion, thus confirming the hypothesis.

Table 4.40

Capital charge (CAR) for risk should be extended to other non-bank financial institutions, whether deposit taking or non deposit taking

	Observed N	Expected N	Residual
Strongly agree	23	24.2	-1.2
Agree	60	24.2	35.8
Neutral	10	24.2	-14.2
Disagree	4	24.2	-20.2
Total	97		

Source: primary survey results of the study

A net residual in favour of the assertion was 34.6 and they upheld the null hypothesis. The results there confirmed the hypothesis.

Table 4.41

Banks should be allowed to fail irrespective of the extent of risks they pose to the system if they take bad decisions

	Observed N	Expected N	Residual
Strongly agree	5	24.2	-19.2
Agree	17	24.2	-7.2
Neutral	19	24.2	-5.2
Disagree	56	24.2	31.8
Total	97		

Source: primary survey results of the study

This assertion which was posed in a negative sense was upheld by the results as a negative residual 26.4 of expected values was obtained over the observed values.

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Table 4.42

The derivative market in Ghana should be highly regulated irrespective of whether it is used for hedging or for speculative purposes

	Observed N	Expected N	Residual
Strongly agree	38	32.3	5.7
Agree	48	32.3	15.7
Neutral	11	32.3	-21.3
Total	97		

A residual of 31.4 of expected over the observed frequency were in favour of the assertion with no dissention.

Source: primary survey results of the study

4.2.2 SUMMARY AND CONLUSION OF PRIMARY DATA

The results of the analysis of the study which involved the usage of single or straight analysis and cross tabulations in very limited cases did not support the reasoning behind the null hypotheses. For instance, it did not support the assertion that the current Capital Adequacy Ratio (CAR) framework does not reflect the sophistication and complexity of banks.

On the whole, however, the results overwhelmingly supported the status quo of the study. It generally showed that banks would not want to 'fail' or collapse at any point in time in their business lives. They would also not want to be rescued by government or the tax payer if they can help themselves by creating a fund. The results generally pointed out the willingness of managers of banks in Ghana

to taken on some level of risk to maintain sanity in the financial system. The results again show that majority of the persons who supported the null hypothesis of the study were knowledgeable professionals who have very deep knowledge in risk. It also turned out risk management have been overwhelmingly accepted by the Ghanaian banking players, be it banks with foreign or domestic affiliation. However the degree of effectiveness skewed marginally to the foreign banks.

4.3 SECONDARY DATA ANALYSIS

4.3.1 INTRODUCTION

The twenty-five (25) out of the twenty-six (26) banks in Ghana at the time was used for the purpose of the study. One bank was left out because it had operated for barely eight months, therefore its analysis might distort the general picture of the study. The risk charges used in determining the Capital Adequacy Ratio (CAR) in the Ghanaian banking system was largely based on Basel I framework with some little modification to make banking system more resilient. Credit risk (CR) is thus determined by applying risk weights assets of the banks' from a range of 0-100 depending on the nature of the asset and its risk potential. Market risks (MR) were determined by applying fifty (50%) percentage on the average monthly positions (Long or Short) of the four major trading currencies (US dollar, Euro, Pound Sterling and the CFA) of the banks and finally Operational risks (PR) is determined by finding the three years average of net income of the banks. The Adjusted Capital (AC) is obtained by summing tier one and tier two capitals. Tier one capital constitutes stated capital plus primary reserves less all intangibles, connected lending of long term nature, losses not provided for and investments in unconsolidated subsidiaries. Tier two capital is composed of revaluation reserves, hybrid capital, subordinated debts, undisclosed and latent reserves. Whilst subordinated debt is restricted to 50% of Tier one capital, tier two capital, in totality, is restricted to hundred percent (100%) of Tier one capital. CAR is determined by dividing the adjusted capital (AC) over the risk factors as per the formula below:

CAR= AC/ (CR+MR+PR)*100

. → CAR≥ 10% [statutory requirement]

→ CAR≥ 13% [prudential guide]

Whilst not meeting the statutory CAR requirements attracts sanctions, including the levying of penalty charges, a violation of the prudential guide does attract sanctions. It only serves as a watch list.

The study also considered the relationship and the behaviour of the risk factors with respect to the capital adequacy ratio (CAR) and amongst themselves. It sought to show whether there is a significant relationship between the risk factors and to what extent the identified relationship could impact on CAR, where CAR is the dependent variable and the risk factors are the independent variables. It also considered the relationship of the risk factors with respect to CAR. It therefore considered the ordinary relationship through correlation and causal relationship through granger causality. Granger causality is the extent to which the variables granger causes one another, that is, the extent to which they provide statistically significant information to predict the future of one another based on past information over a series of time. Granger causality of variables in singular, which means if the granger causality of 'A' with respect to 'B' is significant does not necessarily mean the granger causality of 'B' with respect to 'A' should also be significant.

For the purpose of the study the analysis was broken down into 'General' banks, involving all the twenty five (25) banks; 'Large' banks, involving the five large banks; Medium banks, involving six banks, and 'Small' banks involving the rest of the banks. These are listed below:

Table 4.43: GROUPS BANKS IN GHANA *(Based on December 2009 Groupings)*

LARGE GROUP BANKS		MEDIUM GROUP BANKS		SMALL GROUP BANKS	
1	Ghana Commercial Bank	1	National Investment	1	Amalgamated Bank Ltd.

			Bank		
2	Standard Chartered Bank	2	Societe General SSB	2	Bank of Baroda
3	Barclays Bank Ghana Ltd.	3	Stanbic Bank Ghana Ltd.	3	UT Bank
4	ECO Bank Ghana	4	Agricultural Devt. Bank	4	Sahel Sahara Bank (BSIC)
		5	Merchant Bank Ghana Ltd	5	CAL Bank
				6	First Atlantic Bank
				7	Fidelity Bank Limited
				8	Guarantee Trust Bank
				9	HFC Bank
				10	Intercontinental Bank Gh
				11	International Commercial Bank
				12	Prudential Bank
				13	The Trust Bank
				14	United Bank of Africa
				15	UniBank
				16	Zenith Bank Ghana
				17	Access Bank Ghana Ltd.

Source: Bank of Ghana Annual Publication.

4.3.2 GENERAL

Table: 4.44

CORRELATION MATRIX TABLE-GENERAL

	CAR	CR	MR	PR
CAR	1.000000	0.145407	0.224632	0.243880
CR	0.145407	1.000000	0.695782	0.964609
MR	0.224632	0.695782	1.000000	0.689886
PR	0.243880	0.964609	0.689886	1.000000

The table shows that risk factors (Credit Risk, Operational Risk & Market Risk) are highly correlated amongst themselves than they are with CAR. CAR is 14.5%, 22.5% and 24.4% correlated to credit risk, market risk and operation risk respectively. Credit Risk (CR) is 69.6% and 96.5% correlated to market risk (MR) and operational risk (PR) respectively. Market risk is also 68.99% correlated to operational risk.

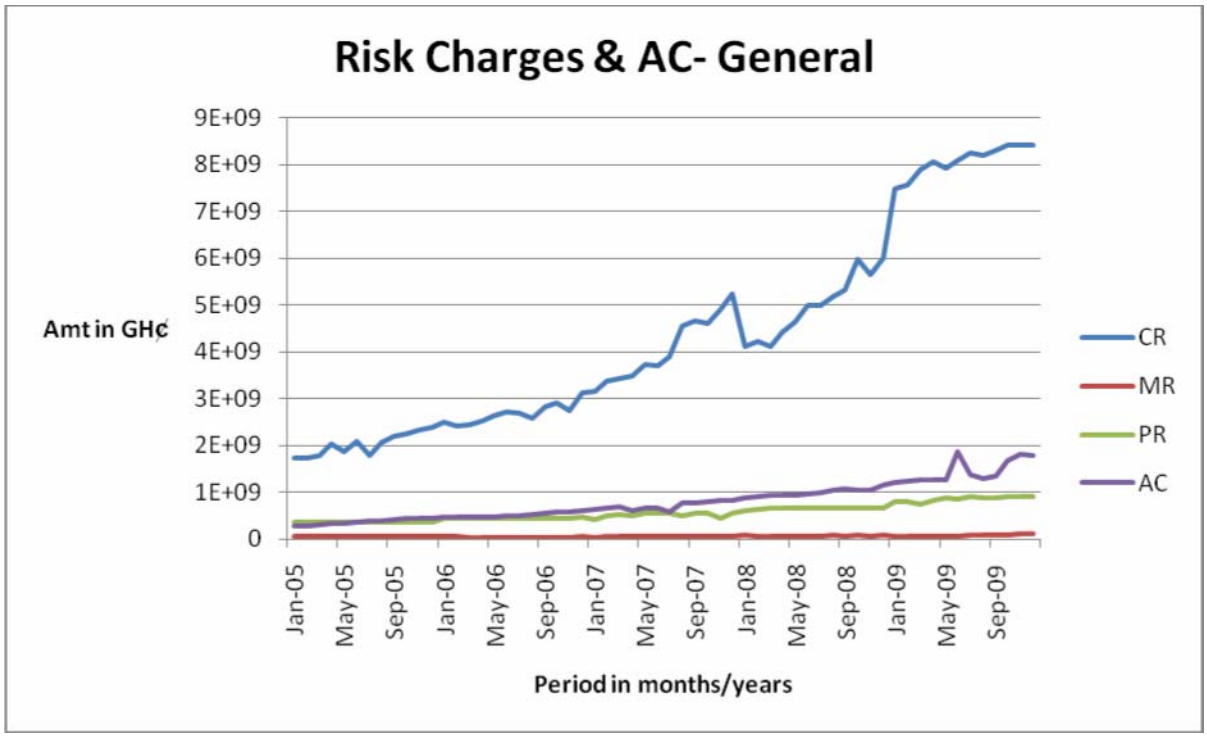
Table: 4.45

DESCRIPTIVE GRAPHS-GENERAL

	CAR	CR	MR	PR
Mean	16.02153	4.36E+09	56228338	5.73E+08
Median	15.93995	3.81E+09	52983897	5.34E+08
Maximum	20.79544	8.42E+09	1.14E+08	9.07E+08
Minimum	12.79597	1.73E+09	25263097	3.68E+08
Std. Dev.	1.745912	2.20E+09	18511513	1.76E+08
Skewness	0.281560	0.679424	1.023443	0.590358
Kurtosis	2.728967	2.151334	4.358716	2.131073
Jarque-Bera	0.976406	6.416751	15.08962	5.372812
Probability	0.613728	0.040422	0.000529	0.068125
Sum	961.2916	2.62E+11	3.37E+09	3.44E+10
Sum Sq. Dev.	179.8443	2.85E+20	2.02E+16	1.83E+18
Observations	60	60	60	60

The table shows an observation involving sixty activities (i.e. sixty months). It again shows that the average CAR of banks in Ghana is 16.02% and maximum CAR that the banks obtained was over 20%, whilst the minimum was about 12.7%. Statutorily banks are required to keep CAR of not less than ten percent (10%) and a prudential buffer of three percent (3%) making it thirteen percent (13%). This means that the banking system in Ghana is solvent as far capital adequacy is concerned. CAR was computed based on cumulated figures of the bank and not on individual basis.

Figure 4.1: SINGLE GRAPH-GENERAL

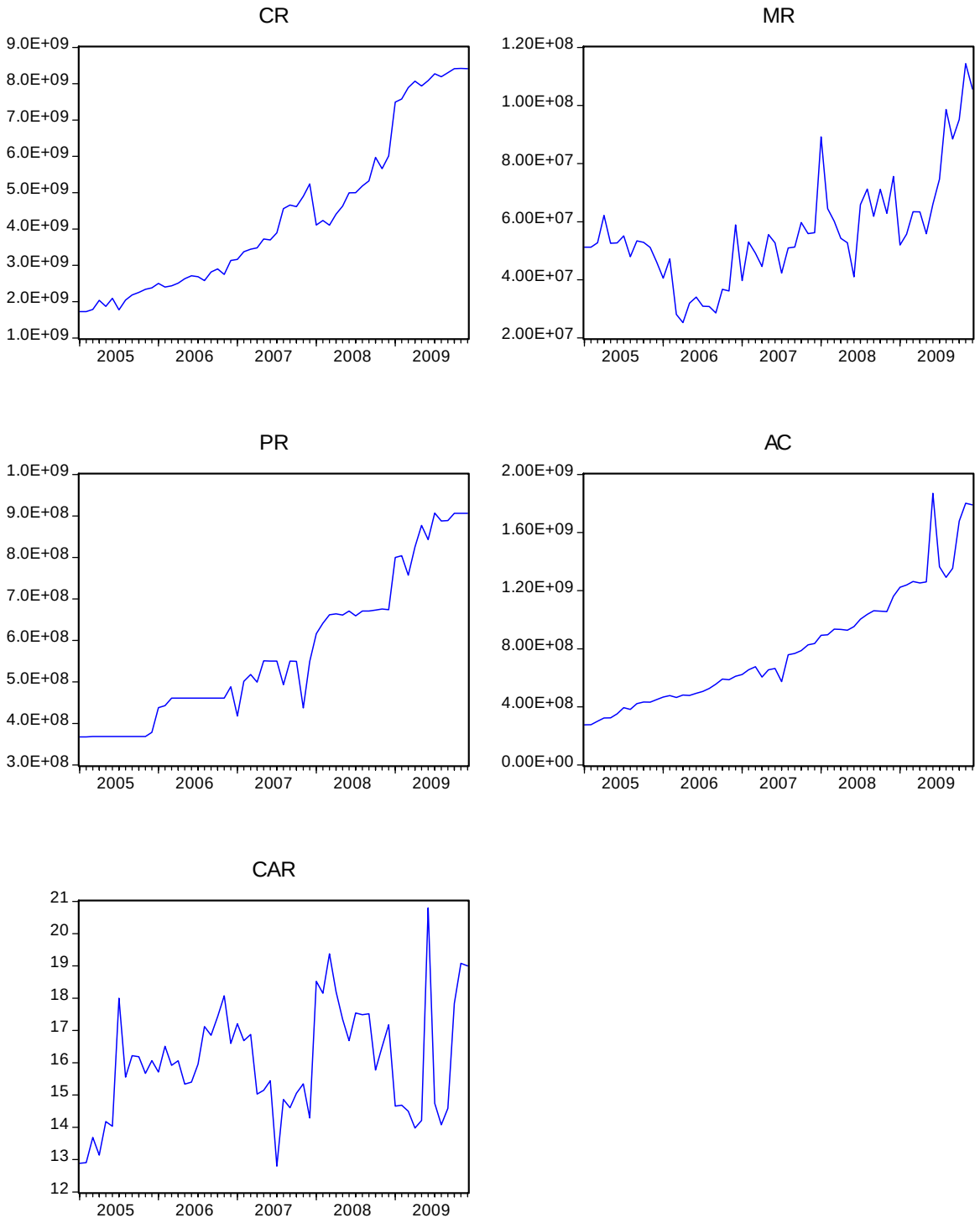


The above graph shows that the capital charge for market and operational risks in Ghana were almost negligible, compared to Credit risk. The dominant capital charge was credit risk. This is because banks in Ghana were largely engage in rudimentary banking activities involving acceptance of deposits and granting of credits. Banks hardly engaged in sophisticated activities such as derivatives, proprietary trading etc. In view of this, the basic form of capital charge was applied to all the risk factors. The paradox is that though operational risk was quite rife in the Ghanaian banking system (due mainly to increased systems breakdowns, increased cyber and other fraudulent activities, lack of staff appreciation of new technologies and the effect on the entire system) the capital charge allocated to it was negligible. The graph of the credit risk charge is upward sloping and steeper than the other risk charges due to the growth in the size of the banks portfolio as well as an increase in the number of banks licensed in the later years of the study. The slope of the PR is low even when new banks were licensed because PR is determined based on audited net income of the banks, which at least have a time lag for one year before books are prepared, and even thereafter it takes a considerable period of time before banks breakeven, let alone making

profits. In view of this, despite the reality that the banks operational risk were soaring due to the factors enumerated above and the likelihood that it would even be bigger as they grow in size, the charges allocated to make up for these short comings are low.

The Credit risk charge is obtained by valuing the risky assets based on assigned valuation estimates given by Basel I. The Market risk charge is also obtained applying five percent (5%) on the Net Open Position (NOP) of the banks' forex trading. The Operational risk charge is simply a hundred percent (100%) charge of three years average of net income.

Figure 4.2: MULTIPLE GRAPHS-GENERAL



The above graphs show that CAR shot up in 2005 mainly because, new banks which were licensed during the period had appreciable levels of stated capital

with little risk in view of the reasoning that they were yet to expand their operations as well as deal in risky activities. CAR reduced and hovered around sixteen percent (16%) as the banks dealt more and more in risky assets. Again new licences were granted to two banks in 2006 thus soaring up the CAR. The CAR dipped in 2007 mainly because of the massive clean-up in the books of Barclays Bank Ghana Limited, the second largest bank in terms of assets at the time. The industry CAR was below the prudential buffer of 13% in 2005 and 2007 but it shot to about 29% in 2009. The increment of CAR in 2009 was due mainly to the statutory regulatory requirement of foreign banks to increase stated capital to GH□60 million by 2010. Also most of the domestic banks who were also expected to build up their stated capital to GH□25 million by 2010 took proactive steps to inject more capital before the deadline. The increase in CAR was due to an effect which is directly proportional to increases capital and inversely proportional to increases in the risks factors. This means that newly licensed banks have the tendency of increasing CAR since they come on board with an unencumbered capital with little or no risk as shown in the Adjusted Capital (AC) graph.

The graphs again show that whilst the slope of the credit risk charge is steep, the risk charges of market and operational risk are gentle, with market risk depicting an erratic movement.

Table 4.46: GRANGERCAUSALITY – GENERAL

Pairwise Granger Causality Tests

Date: 02/17/10 Time: 03:40

Sample: 2005M01 2009M12

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Probability
MR does not Granger Cause CR	58	0.16523	0.84814
CR does not Granger Cause MR		4.65504	0.01373
PR does not Granger Cause CR	58	6.79271	0.00236
CR does not Granger Cause PR		5.00427	0.01021
AC does not Granger Cause CR	58	0.60546	0.54956
CR does not Granger Cause AC		8.00524	0.00092
CAR does not Granger Cause CR	58	0.79185	0.45829
CR does not Granger Cause CAR		1.13338	0.32962
PR does not Granger Cause MR	58	2.69999	0.07645
MR does not Granger Cause PR		0.52520	0.59448
AC does not Granger Cause MR	58	4.40310	0.01702
MR does not Granger Cause AC		2.33202	0.10699
CAR does not Granger Cause MR	58	0.41705	0.66113
MR does not Granger Cause CAR		0.95869	0.38994
AC does not Granger Cause PR	58	6.69304	0.00256
PR does not Granger Cause AC		6.73656	0.00247
CAR does not Granger Cause PR	58	0.89102	0.41629
PR does not Granger Cause CAR		2.76626	0.07199
CAR does not Granger Cause AC	58	3.70258	0.03125
AC does not Granger Cause CAR		0.18922	0.82816

The above table shows that based on fifty-eight (58) observations (due a lag of two) Credit Risk (CR) granger causes Market Risk (MR) and PR at a probability of 96.27% and 99.0% respectively. This means that the past events of CR could be significant and useful to help explain future events of MR and PR at 96.27% and 99.0% probabilities respectively.

Table 4.47: DESCRIPTIVE STATISTICS-GENERAL

	CR	MR	PR	AC	**CAR**
Mean	4.36E+09	56228338	5.73E+08	8.06E+08	**16.02153**
Median	3.81E+09	52983897	5.34E+08	6.70E+08	**15.93995**
Maximum	8.42E+09	1.14E+08	9.07E+08	1.87E+09	**20.79544**
Minimum	1.73E+09	25263097	3.68E+08	2.76E+08	**12.79597**
Std. Dev.	2.20E+09	18511513	1.76E+08	4.07E+08	**1.745912**
Skewness	0.679424	1.023443	0.590358	0.857797	**0.281560**
Kurtosis	2.151334	4.358716	2.131073	3.050273	**2.728967**
Jarque-Bera	6.416751	15.08962	5.372812	7.364478	**0.976406**
Probability	0.040422	0.000529	0.068125	0.025167	**0.613728**
Sum	2.62E+11	3.37E+09	3.44E+10	4.84E+10	**961.2916**
Sum Sq. Dev.	2.85E+20	2.02E+16	1.83E+18	9.78E+18	**179.8443**
Observations	60	60	60	60	**60**

The statistics show that based on sixty (60) observations the average CAR of the Banking System in Ghana since 2005 to 2009 was 16.02% and the maximum and minimum CAR are 20.80% and 12.80% respectively. This means considering the variability or spread of 1.75 percentage points from the mean the Ghanaian Banking Industry in general could be considered less vulnerable to normal adverse business and economic conditions based on a statutory CAR of 10% and a prudential buffer of 13%.

CAPITAL ADEQUACY RATIO

Table 4.48: Augmented Dickey-Fuller Test Statistic

Null Hypothesis: CAR has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic based on SIC, MAXLAG=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.438182	0.0007
Test critical values:	1% level	-3.546099	
	5% level	-2.911730	
	10% level	-2.593551	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(CAR)

Method: Least Squares

Date: 02/17/10 Time: 10:14

Sample (adjusted): 2005M02 2009M12

Included observations: 59 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAR(-1)	-0.510880	0.115110	-4.438182	0.0000
C	8.262904	1.848825	4.469272	0.0000

R-squared	0.256820	Mean dependent var	0.103650
Adjusted R-squared	0.243782	S.D. dependent var	1.729951
S.E. of regression	1.504379	Akaike info criterion	3.687948
Sum squared resid	128.9999	Schwarz criterion	3.758373
Log likelihood	-106.7945	F-statistic	19.69746
Durbin-Watson stat	2.146121	Prob(F-statistic)	0.000042

The above table shows that CAR has been stationary over the period at 1% significant level since the 'Augmented Dickey-Fuller' test statistic was above the 'test critical values' at 1% significant level. This means it can be asserted with 99.0% confidence that that CAR has been stationary throughout the period. This again means that most of the banks would hardly move away from the targeted CAR. Also because of lack of sophistication in the Ghanaian banking system, the CAR of the system is relatively more stationary. Growth oriented banks may determine their operations based on their capital and projected capital receipts or growth in capital. The R-squared of 25% and an adjusted R2 of 24.4 % (after adjusting for errors) showed that averagely about 25% of the behaviour of the dependent variable could be explained by the independent variables. It however does not consider the causality of the independent variables.

4.3.3 LARGE GROUP BANKS (LGBs)

For the purpose of the study four large banks emerged based on determination by asset size at the year-end of 2009. The four (4) banks, in no special order, were the Ghana Commercial Bank (GCB), the Barclays Bank Ghana Limited (BBG), the Standard Chartered Bank Ghana Limited (SCB) and the Ecobank Ghana Limited (ECO).

Table: 4.49

CORRELATION MATRIX TABLE-(LGBs)

	CR	MR	PR	AC	CAR
CR	1.000000	0.176847	0.936299	0.964385	-0.327669
MR	0.176847	1.000000	0.245506	0.227033	-0.109181
PR	0.936299	0.245506	1.000000	0.932194	-0.263861
AC	0.964385	0.227033	0.932194	1.000000	-0.097198
CAR	-0.327669	-0.109181	-0.263861	-0.097198	1.000000

The table above shows that Operational risk (PR) is highly correlated to Credit

risk (CR) at 93.6% and marginally correlated to Market Risk and CAR by (24.6%). Adjusted Capital (AC) is highly correlated to CR and PR at 96.4% and 93.2% respectively. The dependent variable CAR is highly correlated to CR more than the other risk factors, emphasizing the point that the dominant risk factor in the banking system has been CR. The table again shows that generally whilst the risk factors are positively correlated amongst themselves they are inversely correlated to CAR, the dependent variable.

Table: 4.50

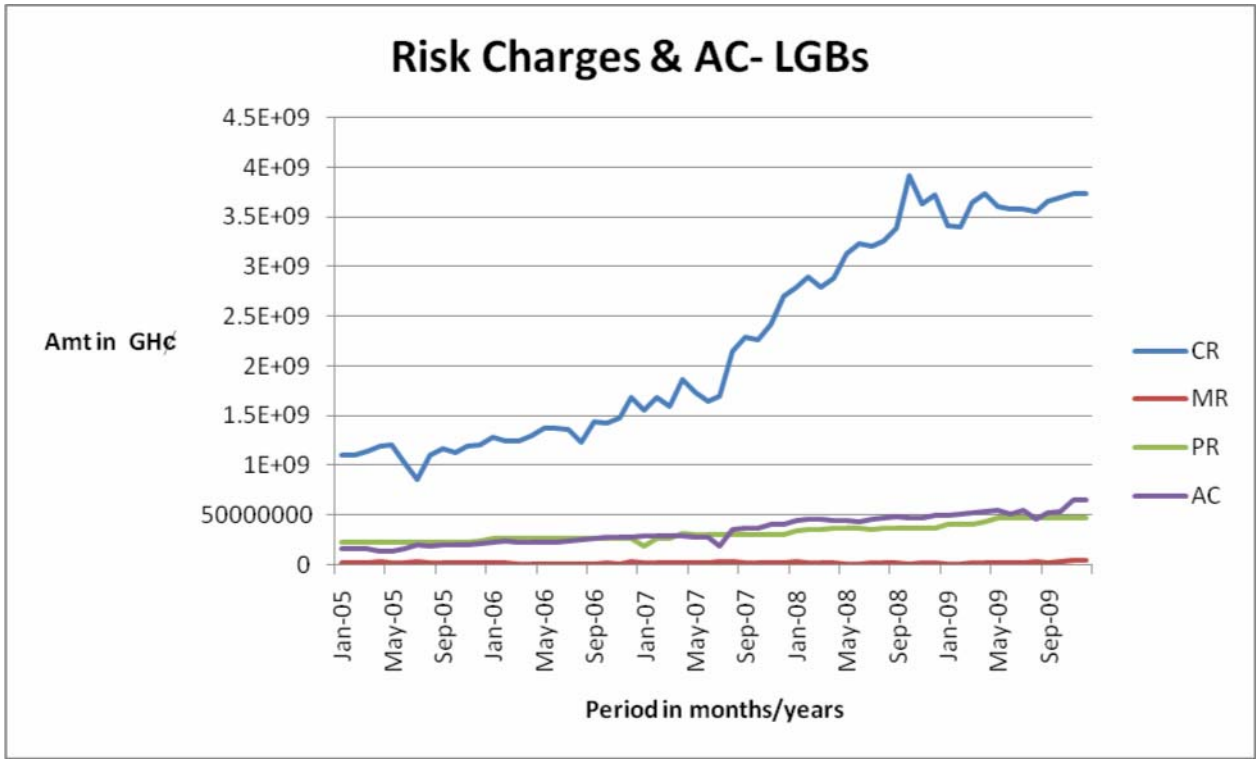
DESCRIPTIVE STATISTICAL TABLE-LARGE

	CR	MR	PR	AC	CAR
Mean	2.26E+09	22748427	3.17E+08	3.52E+08	13.77409
Median	1.80E+09	21607859	3.01E+08	2.97E+08	13.97023
Maximum	3.92E+09	47510755	4.67E+08	6.55E+08	18.30534
Minimum	8.55E+08	10191996	1.89E+08	1.39E+08	9.245902
Std. Dev.	1.04E+09	8407064.	82183394	1.42E+08	1.700343
Skewness	0.269715	0.895907	0.561011	0.261312	-0.312594
Kurtosis	1.401839	3.968603	2.133714	1.824848	3.779445
Jarque-Bera	7.112753	10.37198	5.023461	4.135295	2.495986
Probability	0.028542	0.005594	0.081128	0.126483	0.287080
Sum	1.36E+11	1.36E+09	1.90E+10	2.11E+10	826.4457
Sum Sq. Dev.	6.34E+19	4.17E+15	3.98E+17	1.18E+18	170.5788
Observations	60	60	60	60	60

The above shows that out of sixty (60) observations involving monthly data from 2005 to 2009, the large banks recorded an average CAR of 13.7%. The highest

CAR that any of the banks recorded during the period was 18.3%, whilst some of the banks recorded as low as 9.2%, below the statutory limit of 10%. Ghana Commercial Bank on few occasions during the period recorded a CAR below the statutory requirement due to deterioration in its NPLs.

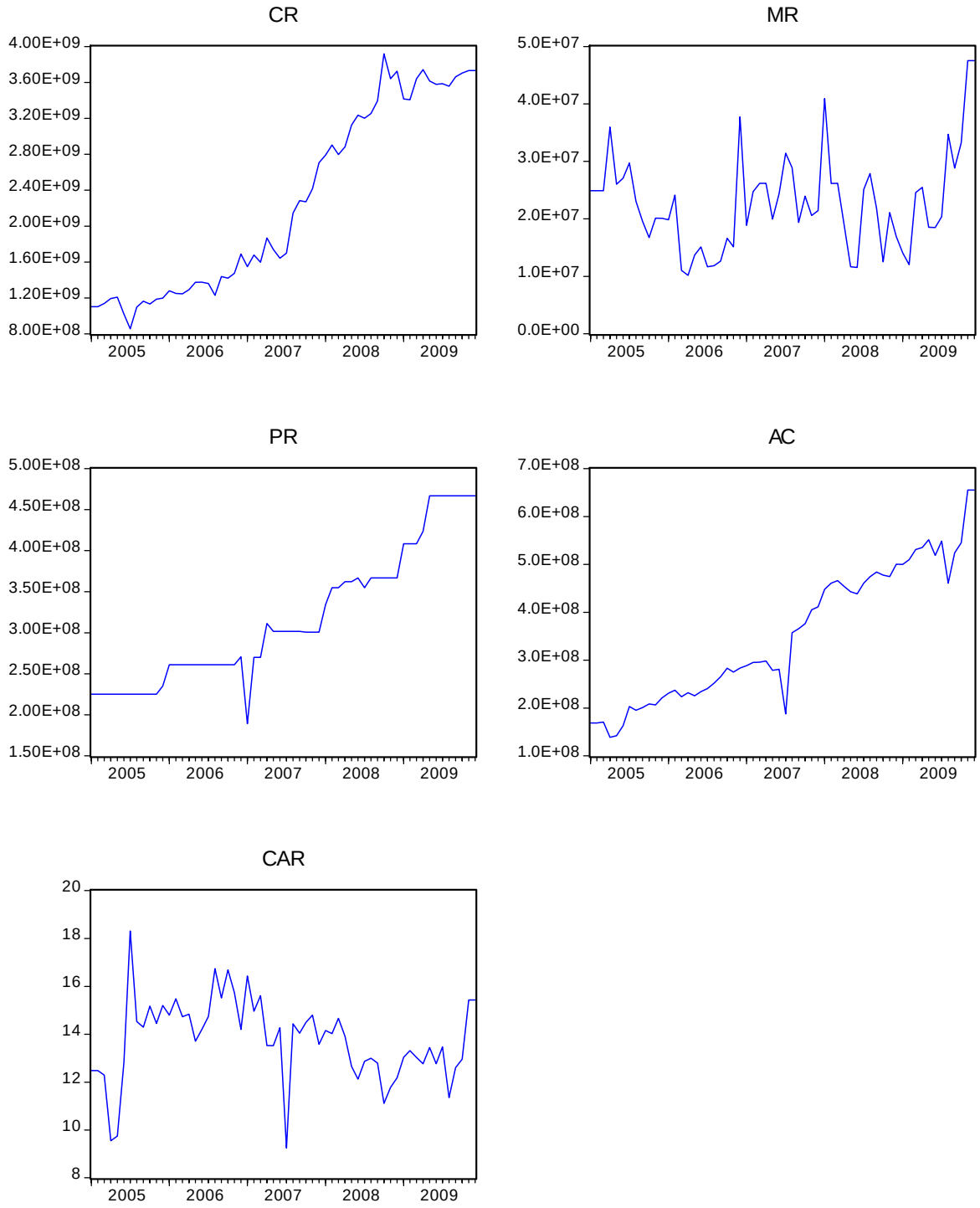
Figure 4.3: SINGLE GRAPH – (LGBs)



The above graph also emphasises the point that CR is the dominant risk factor. It soared up in 2008 due to the worsening of the macro economic factors leading increase in Non Performing Loans (NPLs) of the industry with the large banks badly hit. Market risk is the least of the risk charges due to lack of sophistication the treasury operations of the banking system in Ghana. Besides, the market risk mechanism used by the banking system in Ghana captures only the effects exchange rates leaving out interest rates and the other relevant market risk elements. The operational risk curve was low and marginal

despite the seeming increase in failures and systems breakdowns of the LGBs and the banking system as a whole.

Figure 4.4: MULTIPLE GRAPHS-LGBs



The above graphs depicts that the capital adequacy ratio (CAR) of the banks dipped between 2005 and 2008 due mainly to the acute deterioration in capital by two of the

large banks (BBG &GCB) due a rise in their non-performing assets NPL. Whilst GCB suffered rising NPL due mainly to deterioration in Tema Oil Refinery (TOR)[24] debts, BBG suffered mainly because of strategic failure, that is, massive expansion programme targeted at SMEs. SMES are conventionally risky institutions and this coupled with uncontrolled expansion into a fairly maiden terrain was the main cause of the deterioration. Whilst BBG recorded CAR as low as 7.56% for three months in 2005, GCB also recorded CAR as low as 7.05% for four months. Though the banks recovered at the later months of the year, the deterioration was so serious that it affected the yearly average. The behaviour of the Adjusted Capital (AC) is directly proportional to the CAR as depicted in figure 4 above. A rise in AC positively influences CAR and vice versa. However the degree of impact on CAR by AC depends on the extent of increase of the other risk factors, especially CR, which is the dominant risk factor.

Operational risks dipped mainly due the reduction in net income of the banks as the charge is based on net income of banks of the banks. Market risk however soared appreciably at some points in 2005, 2006, 2007 and 2009 due mainly to increase in forex trading as a result of licensing of new foreign banks which were required to at least employ sixty percent (60%) of their capital in foreign currency.

Table 4.51: GRANGER CAUSALITY –(LGBs)

Pairwise Granger Causality Tests
Date: 02/18/10 Time: 07:23
Sample: 2005M01 2009M12
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Probability
MR does not Granger Cause CR	58	0.15107	0.86016
CR does not Granger Cause MR		0.60539	0.54959
PR does not Granger Cause CR	58	1.18529	0.31363

[24] TOR is a single largest customer of GCB and controlled about half of its earning assets and income during the period.

CR does not Granger Cause PR		4.34767	0.01785
AC does not Granger Cause CR	58	1.81123	0.17342
CR does not Granger Cause AC		1.61514	0.20850
CAR does not Granger Cause CR	58	1.10977	0.33717
CR does not Granger Cause CAR		0.85946	0.42921
PR does not Granger Cause MR	58	1.89885	0.15979
MR does not Granger Cause PR		2.27183	0.11308
AC does not Granger Cause MR	58	0.65323	0.52450
MR does not Granger Cause AC		2.23045	0.11747
CAR does not Granger Cause MR	58	0.19145	0.82633
MR does not Granger Cause CAR		0.22092	0.80251
AC does not Granger Cause PR	58	4.41470	0.01685
PR does not Granger Cause AC		0.98128	0.38154
CAR does not Granger Cause PR	58	0.47198	0.62636
PR does not Granger Cause CAR		0.75838	0.47344
CAR does not Granger Cause AC	58	1.78327	0.17802
AC does not Granger Cause CAR		0.91431	0.40702

The above granger causality test shows that Credit Risk (CR) granger causes Operational Risk (PR) and Adjusted Capital (AC) at 98.3% and 80.0% respectively. This means that past events of CR are useful and significant in forecasting operational risk and adjusted capital. MR also granger causes PR at 89.0%, whilst CAR granger causes MR at 85.0%.

Table 4.52: AUGMENTED DICKEY-FULLER TEST- LARGE

Null Hypothesis: CAR has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic based on SIC, MAXLAG=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.303429	0.0192
Test critical values:	1% level	-3.548208	
	5% level	-2.912631	
	10% level	-2.594027	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(CAR)

Method: Least Squares

Date: 02/18/10 Time: 08:09

Sample (adjusted): 2005M03 2009M12

Included observations: 58 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAR(-1)	-0.443361	0.134212	-3.303429	0.0017
D(CAR(-1))	-0.099220	0.134778	-0.736176	0.4648
C	6.160070	1.854818	3.321118	0.0016

R-squared	0.252399	Mean dependent var	0.050903
Adjusted R-squared	0.225214	S.D. dependent var	1.700161
S.E. of regression	1.496515	Akaike info criterion	3.694494
Sum squared resid	123.1756	Schwarz criterion	3.801068
Log likelihood	-104.1403	F-statistic	9.284341
Durbin-Watson stat	1.993989	Prob(F-statistic)	0.000336

The 'Dickey-Fuller Test Equation' reveals that CAR is stationary at 5% significant level. This means that it could be asserted with 95% confidence that the CAR of large banks is stationary. Also from the descriptive statistics it can be inferred that large banks plan their CAR around the prudential buffer of 13.0%.

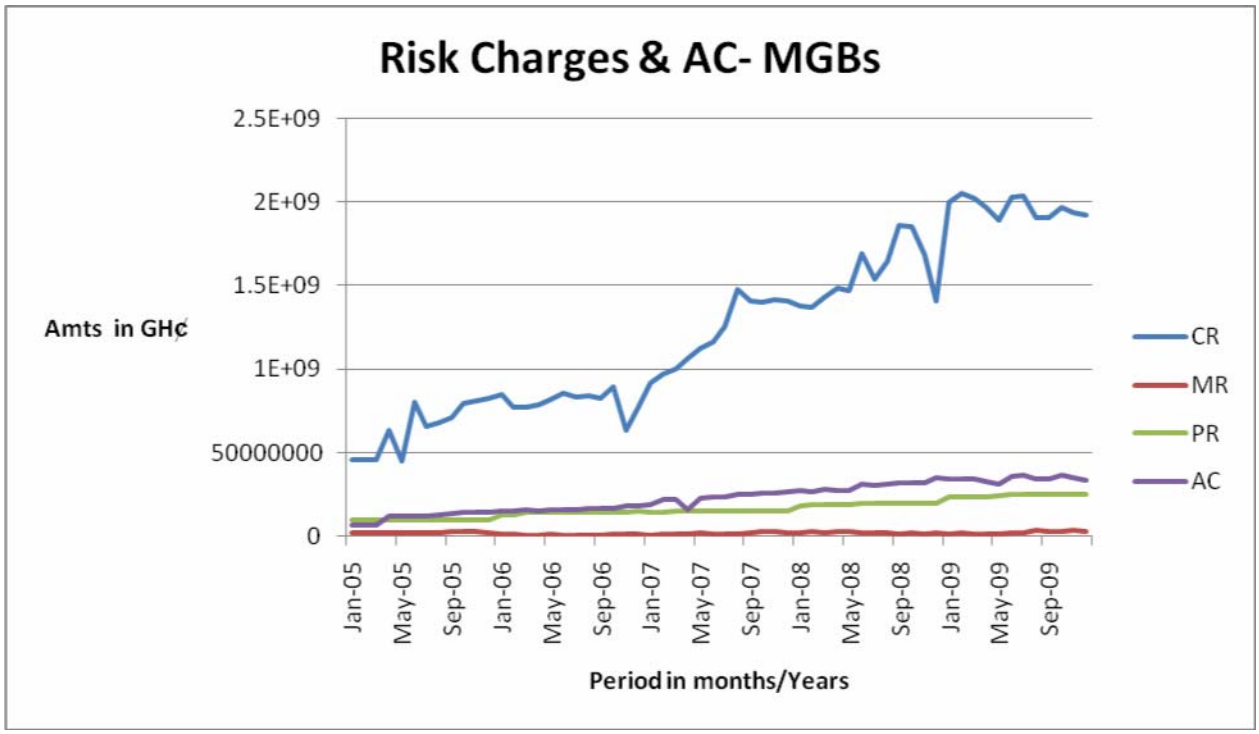
3.1.1 MEDIUM SCALE BANKS (MCBs)

Table 4.53: CORRELATION MATRIX- MSBs

	CR	MR	PR	AC	CAR
CR	1.000000	0.281656	0.937261	0.967944	-0.120096
MR	0.281656	1.000000	0.206502	0.256674	-0.216545
PR	0.937261	0.206502	1.000000	0.938024	-0.018026
AC	0.967944	0.256674	0.938024	1.000000	0.110689
CAR	-0.120096	-0.216545	-0.018026	0.110689	1.000000

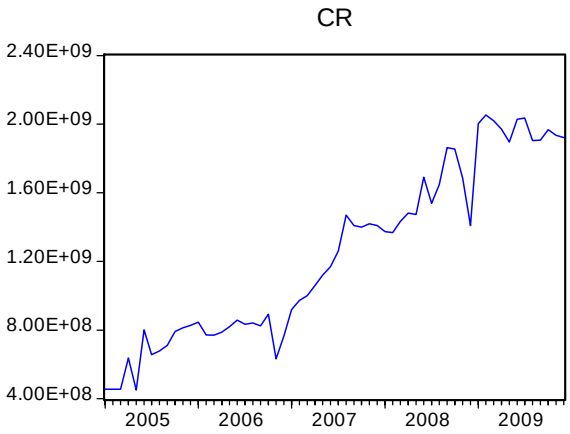
The above table shows that the PR is highly correlated with CR at 93.7%. PR is however marginally correlated to MR. Again AC is highly correlated to CR and PR at 96.8% and 93.8% respectively. PR was however marginally correlated to MR at 25.7%. All the three risk factors were negatively correlated to CAR at various levels of probabilities.

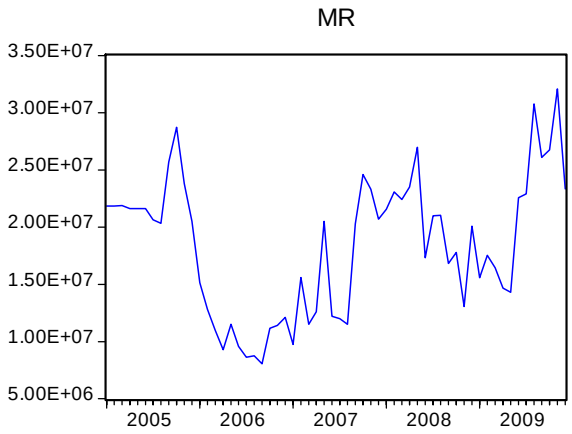
Figure 4.5: SINGLE GRAPHS-MGBs

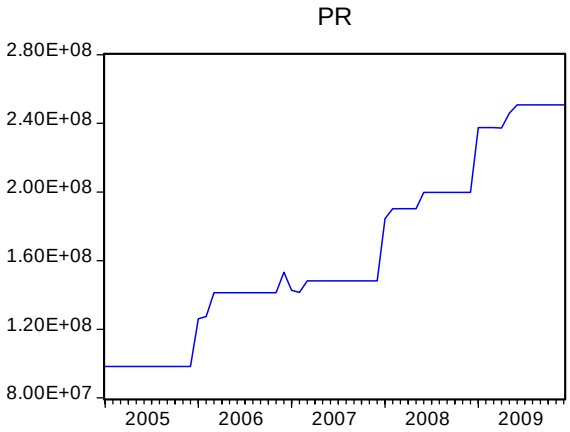


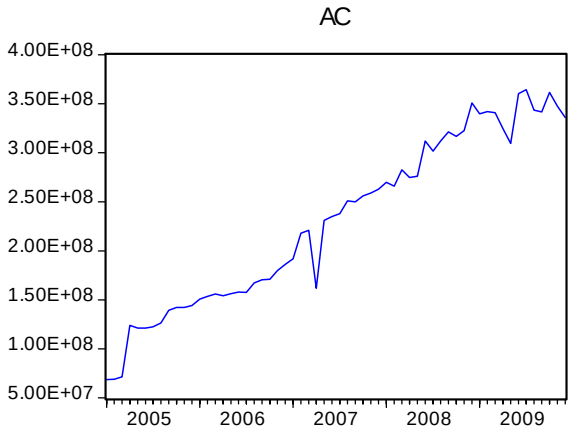
The above graph shows that the CR of MGBs shows a rising slope indicating growth in credit risk as the banks increase in size. It is the dominant risk charge amongst the Operational and Market risks charges.

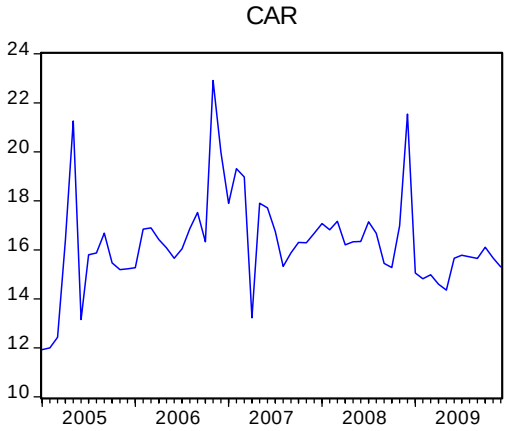
Figure 4.6: MULTIPLE CORRELATION GRAPHS- MGBs











The above correlation graphs show that CR is the main driver of the capital adequacy ratio. Despite the significant rise in both MR and PR, they were not enough to influence the CAR. CAR was mainly influence by CR. All the risk

charges depicted growth tendencies with varying degrees of slopes in their curves. The adjusted capital (AC) which directly proportional to CAR continued to grow as the banks continued to increase their portfolios. This means that the banks provided capital as they take on risk by benchmarking the statutory capital of 10%.

TABLE 4.54: GRANGER CAUSALITY MGBs

Pairwise Granger Causality Tests
Date: 02/18/10 Time: 16:27
Sample: 2005M01 2009M12
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Probability
MR does not Granger Cause CR	58	1.03532	0.36218
CR does not Granger Cause MR		1.11264	0.33624
PR does not Granger Cause CR	58	1.21118	0.30596
CR does not Granger Cause PR		5.13566	0.00915
AC does not Granger Cause CR	58	8.83286	0.00049
CR does not Granger Cause AC		0.87563	0.42254
CAR does not Granger Cause CR	58	4.93052	0.01087
CR does not Granger Cause CAR		0.73068	0.48637
PR does not Granger Cause MR	58	0.82757	0.44268
MR does not Granger Cause PR		0.10938	0.89659
AC does not Granger Cause MR	58	1.29215	0.28319
MR does not Granger Cause AC		0.55304	0.57848
CAR does not Granger Cause MR	58	0.93463	0.39911
MR does not Granger Cause CAR		2.08172	0.13480
AC does not Granger Cause PR	58	3.38108	0.04150
PR does not Granger Cause AC		0.70820	0.49713

CAR does not Granger Cause PR	58	2.65346	0.07975
PR does not Granger Cause CAR		0.48446	0.61873
CAR does not Granger Cause AC	58	1.32751	0.27381
AC does not Granger Cause CAR		1.13920	0.32779

The above table shows that CR granger causes PR at 99.09% probability. This means that past events of CR are useful and significant in forecasting operational risk. Granger causality of the other risk charges for one another is marginal. However CAR granger causes all the other risk charges as various rates of probabilities.

Table 4.55: AUGMENTED DICKEY-FULLER TEST

Null Hypothesis: CAR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic based on SIC, MAXLAG=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.814235	0.0000
Test critical values:	1% level	-3.546099	
	5% level	-2.911730	
	10% level	-2.593551	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CAR)
Method: Least Squares
Date: 02/18/10 Time: 16:45
Sample (adjusted): 2005M02 2009M12
Included observations: 59 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAR(-1)	-0.702798	0.120875	-5.814235	0.0000
C	11.51632	1.985411	5.800469	0.0000
R-squared	0.372284	Mean dependent var		0.057157
Adjusted R-squared	0.361271	S.D. dependent var		2.304414
S.E. of regression	1.841700	Akaike info criterion		4.092565
Sum squared resid	193.3359	Schwarz criterion		4.162990
Log likelihood	-118.7307	F-statistic		33.80532
Durbin-Watson stat	2.071960	Prob(F-statistic)		0.000000

The 'Dickey-Fuller Test Equation' reveals that CAR is stationary at 5% significant level. This means that the Medium Group banks because none of the banks licensed fell into this category straight away. By the time they mature into the MGBs their CAR is stationary because they usually determine their risk appetite by benchmarking their CAR around the statutory minimum CAR of 10% or the prudential buffer of 13.0%.

4.3.4 SMALL GROUP BANKS (SGBs)

The Small Group banks (SGBs) involve seventeen (17) banks. However, one bank was not considered for the study since it had operated for less than one year at the end of 2009.

Table 4.56: CORRELATION MATRIX TABLE-SMALL GROUP BANKS (SGBs)

	CR	MR	PR	AC	CAR
CR	1.000000	0.872287	0.968656	0.880194	-0.286524
MR	0.872287	1.000000	0.841468	0.912186	-0.011519
PR	0.968656	0.841468	1.000000	0.907003	-0.196388
AC	0.880194	0.912186	0.907003	1.000000	0.145222
CAR	-0.286524	-0.011519	-0.196388	0.145222	1.000000

The above table shows that CR is highly correlated to MR, PR and AC at

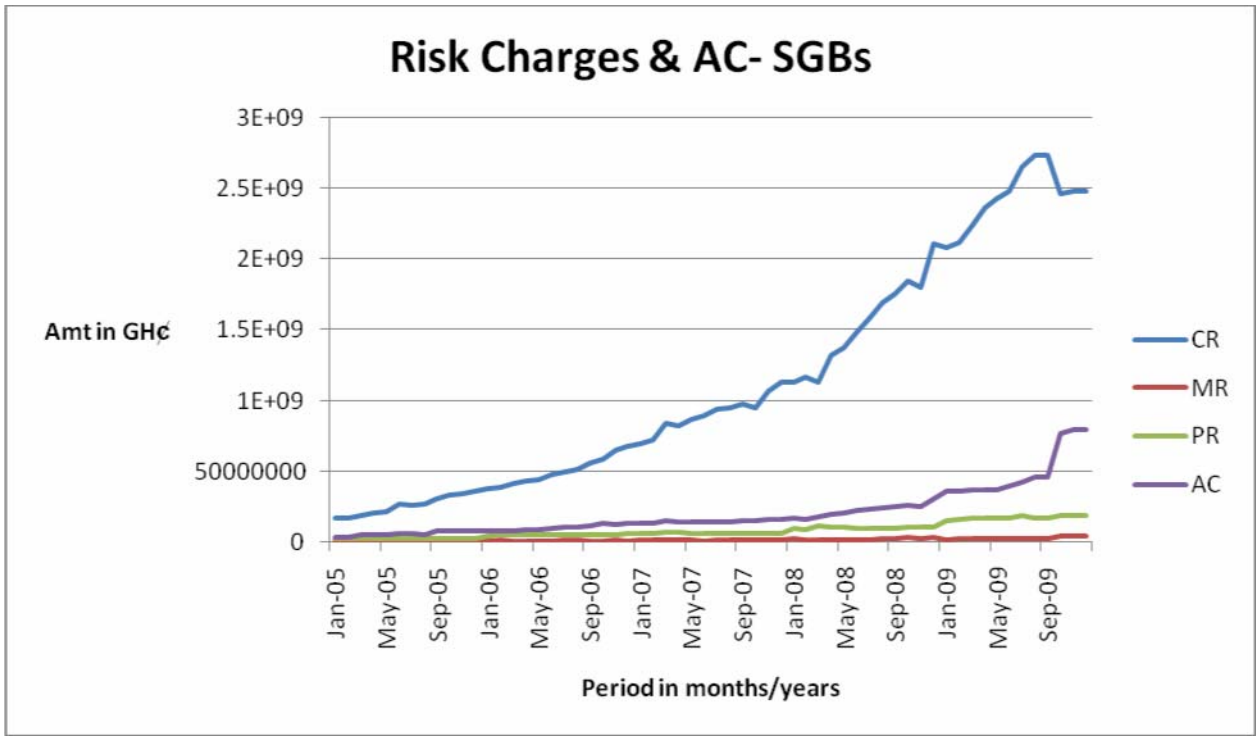
probabilities of 87.2%, 96.9% and 88.0% respectively. MR is also highly correlated to PR and AC at probabilities of 84.1% and 91.2% respectively. Finally, PR is highly correlated to AC at 90.7%. This means that the risk factors are highly correlated among themselves at various levels of probabilities. Their interaction could therefore generate an additional risk.

Table 4.57: DESCRIPTIVE STATISTICS-SMALL GROUP BANKS

	CR	MR	PR	AC	CAR
Mean	1.12E+09	15666158	87865617	2.11E+08	17.99076
Median	9.13E+08	11330000	68533520	1.50E+08	16.69180
Maximum	2.73E+09	48213001	1.89E+08	7.99E+08	29.42567
Minimum	1.69E+08	4007254.	29931506	39050643	13.28159
Std. Dev.	8.12E+08	11628831	50521449	1.75E+08	4.267704
Skewness	0.633614	1.374218	0.761103	1.930673	1.058233
Kurtosis	2.043718	4.130541	2.379831	6.703284	3.419974
Jarque-Bera	6.300852	22.08006	6.754299	71.56077	11.63951
Probability	0.042834	0.000016	0.034145	0.000000	0.002968
Sum	6.75E+10	9.40E+08	5.27E+09	1.26E+10	1079.446
Sum Sq. Dev.	3.89E+19	7.98E+15	1.51E+17	1.80E+18	1074.584
Observations	60	60	60	60	60

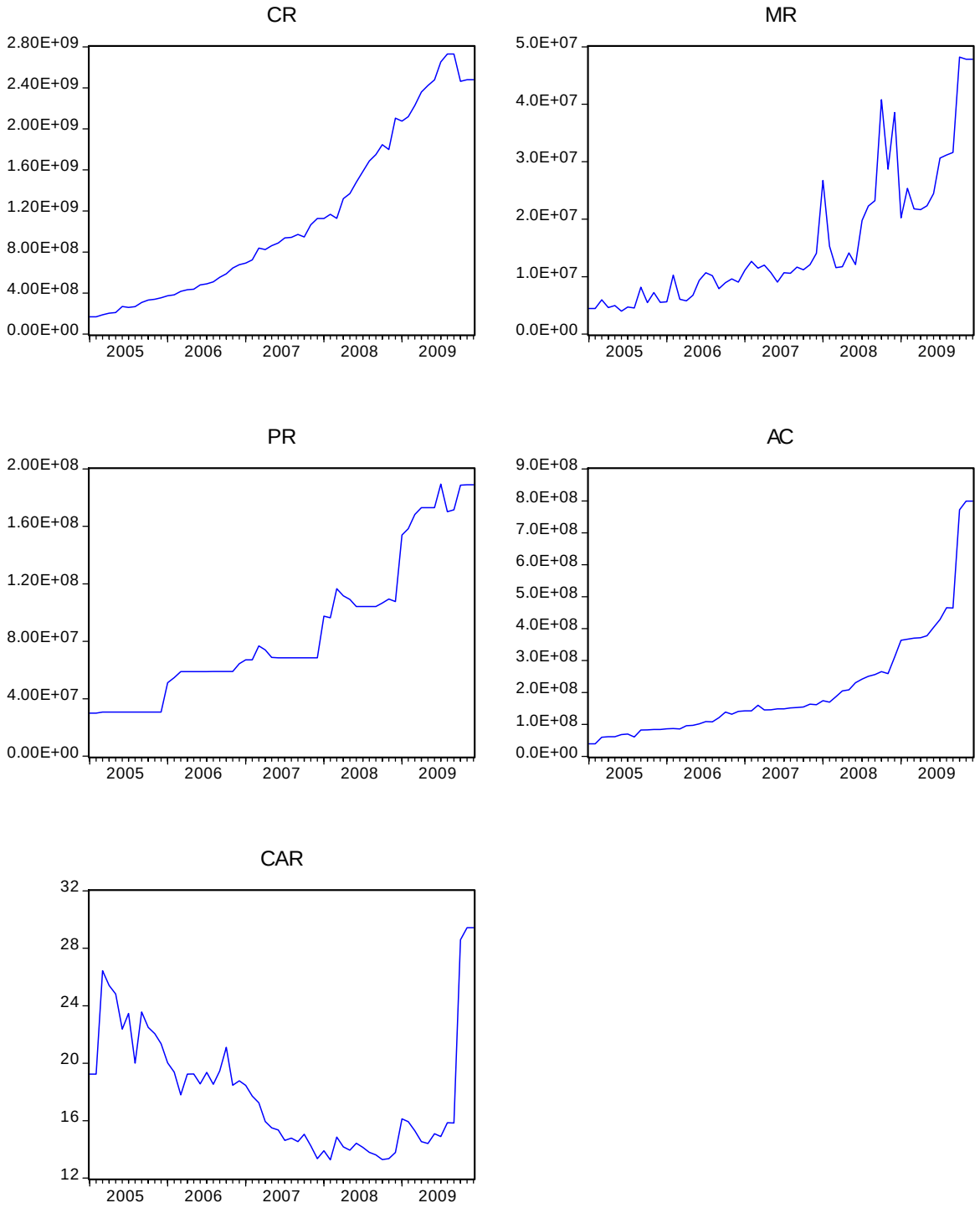
The above statistics show that the average CAR of the Small-bank group is 18%, with the maximum and minimum being 29.4% and 13.3% respectively. The average deviation from the mean is 4.2 percentage points. Meaning given the statutory minimum of 10%, collectively banks in the industry are less vulnerable to normal adverse business and economic conditions.

Figure 4.7: SINGLE GRAPH: (SGB)



The above graph shows that credit risk (CR) is the dominant risk of the Small Group Banks (SGB), followed by Operational risk (PR) and Market risk (MR). This means that, like the other groups, banks in the SGB are not engaged in sophisticated treasury products such proprietary trading and derivatives. The paradox is also that even though, thefts and general system failures and breakdowns in the Ghanaian system the risk associated to operations and for that matter, the Operational risk charge is negligible. The CR soared reaching a peak in mid 2009 due mainly to increasing Non Performing Loans (NPLs) as a result of deteriorating economic conditions. The economy however stabilised from mid-year of 2009 resulting in payment of government debts, thus causing a reduction in the NPL and CR as a whole. Despite the increase in the number of banks in this group and the attendant system failures the PR is low because the profit levels of banks in the group.

Figure 4.8: MULTIPLE GRAPHS- (SGBs)



The above multiple graphs show that all the risk charges grow positively just as their capital grow. This means that as business operations grow risk charges also increase. The degree of growth in the risks vis-à-vis the growth in businesses is however not determined. The Adjusted Capital (AC) increased sharply in year 2009 thus increasing industry CAR to about 29%. This was due to the statutory provision of foreign banks to increase their stated capital to at least GH□60 million by the close of year 2009, whilst local banks local banks are required to same in 2012 but must at least attain GH□ 25 million in 2010.

Table 4.58: GRANGER CAUSALITY

Pairwise Granger Causality Tests
Date: 02/19/10 Time: 15:03
Sample: 2005M01 2009M12
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Probability
MR does not Granger Cause CR	58	1.56713	0.21816
CR does not Granger Cause MR		8.91203	0.00046
PR does not Granger Cause CR	58	0.72905	0.48714
CR does not Granger Cause PR		6.50510	0.00298
AC does not Granger Cause CR	58	1.67952	0.19623
CR does not Granger Cause AC		2.75612	0.07266
CAR does not Granger Cause CR	58	2.00315	0.14500
CR does not Granger Cause CAR		2.49823	0.09187
PR does not Granger Cause MR	58	2.20752	0.11999
MR does not Granger Cause PR		3.51260	0.03694
AC does not Granger Cause MR	58	3.90953	0.02608
MR does not Granger Cause AC		0.27813	0.75829
CAR does not Granger Cause MR	58	0.18760	0.82949

MR does not Granger Cause CAR		1.73089	0.18699
AC does not Granger Cause PR	58	0.20895	0.81210
PR does not Granger Cause AC		0.15044	0.86070
CAR does not Granger Cause PR	58	0.57453	0.56644
PR does not Granger Cause CAR		1.30633	0.27939
CAR does not Granger Cause AC	58	0.21194	0.80969
AC does not Granger Cause CAR		1.63015	0.20557

The above table shows that Credit risk (CR) granger causes Market risk (MR) and Operational risk (PR) at a probability of 99.9% and 99.7% respectively. This means that past events of CR are very useful and significant in forecasting Market risk and operational risk. Market risk (MR) also granger causes Operational risk (PR) at 96.3%, meaning past events of MR are significant in useful in forecasting Operational risk (PR).

Table 4.59: DICKEY FULLER TEST

Null Hypothesis: CAR has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic based on SIC, MAXLAG=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.133043	0.6971
Test critical values:	1% level	-3.546099	
	5% level	-2.911730	
	10% level	-2.593551	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(CAR)
Method: Least Squares
Date: 02/20/10 Time: 06:45
Sample (adjusted): 2005M02 2009M12
Included observations: 59 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAR(-1)	-0.081681	0.072090	-1.133043	0.2619
C	1.626321	1.314905	1.236836	0.2212

R-squared	0.022026	Mean dependent var	0.172651
Adjusted R-squared	0.004869	S.D. dependent var	2.217530
S.E. of regression	2.212124	Akaike info criterion	4.459094
Sum squared resid	278.9292	Schwarz criterion	4.529519
Log likelihood	-129.5433	F-statistic	1.283787
Durbin-Watson stat	2.040392	Prob(F-statistic)	0.261940

The above table shows that CAR is not stationary at any of the levels of activity. This is mainly as a result of new banks licensed. When banks are newly licensed, they have little or no portfolio and therefore the risk is low and hence the CAR is high. However as they invest in risky assets to yield good returns the CAR gradually falls. Again the Bank of Ghana (Central Bank) licensed ten (10) banks during the period 2005-2009 and all banks licensed usually fall within the small group. It is for this reason that CAR is not stationary at levels of activity as it is subjected to 'Augmented Dickey-Fuller Test Equation'.

4.3.5 ANALYSIS OF INDIVIDUAL BANKS

Analysis of banks on group basis has a limitation, in that; the strength of some members of the group could collectively overshadow the weaknesses of individual members of the group. In a bid to correct this shortcoming, the study sought to analysed individual banks on monthly basis as presented in the tables and graphs below:

Table 4.60: BANKS MONTHLY CAR YEAR 2005

		JAN	FEB	MAR	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL	AVER
1	ADB	5.54	5.54	5.54	13.99	50.44	9.67	15.40	15.15	14.86	13.56	13.02	14.62	14.01	14.01
2	AMAL	14.46	14.46	14.46	14.68	14.68	14.68	16.62	13.91	14.03	15.27	13.95	14.54	14.61	14.61
3	BAR														
4	BBG	15.66	15.66	15.66	7.56	7.56	7.56	41.07	14.28	14.10	13.78	13.97	12.94	13.66	13.66
5	UT	11.12	11.12	11.12	14.08	13.02	12.78	11.94	11.74	11.51	11.02	10.42	10.02	11.63	11.63
6	BSIC														
7	CAL	64.76	64.76	64.76	70.03	70.88	24.02	62.75	24.13	27.23	23.35	24.12	20.66	33.40	33.40
8	ECO	16.87	16.87	16.87	16.85	19.47	19.65	17.70	15.14	14.31	16.78	15.87	15.80	16.69	16.69
9	FAMB	15.60	15.60	16.62	15.48	15.48	15.48	10.44	11.06	11.12	10.71	10.06	14.32	12.83	12.83
10	FBL														
11	GCB	7.89	7.89	7.72	7.50	7.07	13.97	12.51	13.42	13.08	13.99	12.17	13.75	10.68	10.68
12	GTB														
13	HFC			43.86	36.21	37.07	39.77	39.14	38.25	35.69	36.58	35.94	35.56	37.61	37.61
14	IBG														
15	ICB	37.93	37.93	37.93	35.68	34.55	36.92	40.12	34.75	34.49	36.68	36.72	38.08	36.73	36.73
16	MBGL	9.96	9.96	9.96	11.40	11.40	11.40	10.78	10.89	11.09	11.67	10.04	10.16	10.75	7.42
17	NIB	8.92	8.92	8.92	13.81	13.81	13.81	14.39	14.25	16.06	13.52	14.74	12.04	12.64	12.64
18	PBL	11.21	11.21	11.21	10.51	10.39	10.58	10.20	10.40	10.30	10.10	10.08	10.23	10.50	10.50
19	SCB	14.49	14.49	14.49	11.71	12.64	14.65	15.54	16.02	16.31	17.95	18.02	20.17	15.49	15.49
20	SG-SSB	16.41	16.41	16.41	21.98	21.98	21.98	21.40	22.22	23.19	21.15	21.15	22.23	20.53	20.53
21	STANBIC	16.29	17.00	21.43	54.90	17.44	17.44	18.38	18.35	18.39	17.45	20.15	18.18	19.49	19.49
22	TTB	14.15	14.15	14.15	15.86	15.26	16.99	14.59	16.61	16.30	17.55	18.23	18.16	16.10	16.10
23	UBA	-	-	136.74	115.70	94.81	92.57	63.60	58.36	50.50	45.30	44.76	39.31	59.25	59.25
24	UNIBANK	-	-	30.36	27.72	26.81	25.96	24.51	23.21	21.64	19.65	20.23	19.41	20.44	20.44
25	ZENITH									432.44	324.43	217.72	206.81	271.49	271.49

Source: Prudential returns of banks

Table 4.61: BANKS MONHTLY CAR 2006

		JAN	FEB	MAR	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL	AVER
1	ADB	15.99	16.07	15.73	15.78	15.22	15.40	16.84	17.47	19.72	17.72	17.94	17.94	16.77	16.77
2	AMAL	14.55	14.22	13.71	13.92	14.13	26.18	24.03	21.95	25.54	22.61	22.61	22.70	20.29	20.29
3	BAR														
4	BBG	14.15	17.70	17.58	19.11	15.81	13.86	17.64	19.09	16.34	21.05	19.70	13.65	16.96	16.96
5	UT	14.18	16.79	14.88	14.93	14.65	13.67	14.11	13.59	13.38	13.57	13.33	51.11	17.80	17.80
6	BSIC														
7	CAL	20.78	20.56	19.57	19.34	19.30	17.43	18.37	17.87	17.70	14.74	13.07	13.07	17.12	17.12
8	ECO	18.83	16.06	14.40	13.36	13.06	15.47	12.89	16.92	13.97	16.80	17.60	16.62	15.33	15.33
9	FAMB	12.53	13.50	10.39	12.06	14.82	12.12	12.85	11.49	11.15	12.05	10.69	11.67	12.02	12.02
10	FBL									84.48	91.70	72.16	55.31	73.66	216.60
11	GCB	11.32	11.75	12.84	12.47	11.81	12.58	12.58	13.75	13.23	13.84	12.47	13.23	12.63	12.63
12	GTB				150.23	153.70	148.86	142.60	99.51	73.12	76.14	68.84	60.64	97.22	97.22
13	HFC	29.69	26.67	26.69	24.74	21.73	21.53	20.74	19.86	18.23	16.98	18.59	20.62	21.37	21.37
14	IBG										96.51	100.00	126.15	105.75	105.75
15	ICB	40.11	38.79	34.73	34.80	36.36	35.58	35.66	34.39	39.34	36.87	30.91	29.00	35.12	35.12
16	MBGL	10.71	10.61	11.46	12.70	12.70	12.70	12.69	11.89	12.12	11.82	119.16	11.72	13.04	13.04
17	NIB	10.38	15.57	15.69	14.58	14.59	12.60	12.13	13.10	12.90	10.83	12.14	13.20	11.92	11.92
18	PBL	9.66	9.14	8.56	8.54	8.40	8.13	11.60	11.40	11.63	11.79	11.07	10.74	10.16	10.16
19	SCB	19.85	19.09	14.93	15.56	14.80	16.07	16.37	18.34	19.51	15.78	15.37	14.67	16.56	16.56
20	SG-SSB	22.27	23.65	23.77	20.59	20.57	20.36	20.70	23.27	24.05	23.33	22.39	113.00	24.13	24.13
21	STANBIC	19.21	23.05	21.22	24.32	20.50	18.67	17.13	18.43	16.06	14.68	62.50	14.51	19.52	19.52
22	TTB	15.27	15.30	13.60	13.55	13.63	13.59	14.29	14.71	13.82	14.53	13.68	13.28	14.06	14.06
23	UBA	29.03	29.23	21.76	17.13	16.52	14.46	14.04	14.36	12.68	12.38	12.38	16.96	16.49	16.49
24	UNIBANK	18.12	17.96	22.86	21.79	21.71	21.12	24.36	24.32	26.61	28.82	30.90	25.55	24.19	24.19
25	ZENITH	151.99	78.18	85.52	104.98	83.65	62.34	62.34	53.32	48.64	100.00	35.33	23.98	62.97	62.97

Source: Prudential returns of banks

Table 4.62: BANKS MONTHLY CAR FOR 2007

		JAN	FEB	MAR	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL	AVER
1	ADB	21.20	24.67	21.13	20.08	20.08	21.92	23.23	16.34	17.16	17.91	16.20	16.52	19.27	19.27
2	AMAL	18.58	19.26	16.11	14.86	12.02	11.32	9.31	9.92	8.73	9.67	14.33	13.36	12.02	12.02
3	BAR														
4	BBG	14.70	14.70	16.63	17.69	17.39	18.30	0.20	16.13	13.71	15.01	14.57	11.79	14.24	14.24
5	UT	43.73	44.28	42.69	41.92	40.52	39.34	36.03	37.04	35.85	35.51	34.81	34.76	41.36	41.36
6	BSIC														
7	CAL	12.94	13.53	13.42	14.92	15.15	15.64	15.93	15.48	16.45	16.28	16.20	15.38	21.02	21.02
8	ECO	16.22	13.38	13.37	11.70	12.27	12.42	11.14	11.45	10.20	11.89	16.79	16.64	19.16	19.16
9	FAMB	11.70	11.07	11.51	10.37	10.38	10.95	10.49	10.65	10.43	10.96	12.27	12.26	9.58	9.58
10	FBL	54.58	39.58	51.01	48.21	30.97	26.69	22.52	20.09	18.97	17.48	16.15	11.44	21.07	19.51
11	GCB	17.29	13.60	14.78	11.78	11.96	12.63	11.07	15.21	17.06	15.38	14.38	14.04	14.11	14.11
12	GTB	71.70	70.72	59.83	53.39	47.58	41.59	40.11	41.00	34.17	31.56	29.78	25.03	41.90	41.90
13	HFC	20.02	20.45	18.57	18.40	16.88	17.47	16.10	16.20	16.15	15.67	15.80	15.56	17.06	17.06
14	IBG	61.81	49.34	36.75	19.67	21.81	19.35	18.21	14.77	14.77	13.95	9.82	9.82	17.08	17.08
15	ICB	29.22	29.47	27.04	27.30	26.91	27.12	27.78	24.24	23.69	23.54	22.25	19.39	23.77	23.77
16	MBGL	12.42	11.25	12.13	11.07	10.54	11.52	11.89	12.38	12.03	13.41	14.85	15.90	12.39	12.39
17	NIB	13.97	19.75	22.04	25.56	22.91	18.39	18.23	19.14	18.78	18.23	18.78	18.39	17.59	17.59
18	PBL	10.49	10.57	10.21	10.20	10.38	10.29	10.25	10.99	11.02	10.45	10.44	10.31	10.47	10.47
19	SCB	17.60	19.06	17.65	13.79	12.90	13.75	12.92	13.50	13.04	14.27	14.30	13.17	14.49	14.49
20	SG-SSB	22.62	20.26	20.56	20.54	22.11	21.74	17.38	16.99	17.44	17.32	17.53	17.51	19.03	19.03
21	STANBIC	15.11	22.07	19.21	19.09	16.13	15.19	12.86	14.68	13.76	12.88	12.66	13.55	14.89	14.89
22	TTB	14.45	13.47	11.11	11.96	11.53	11.65	10.64	12.40	12.21	12.00	11.18	12.55	11.22	11.22
23	UBA	20.61	17.76	16.23	14.14	14.22	15.99	17.15	15.67	15.32	16.09	15.44	14.26	14.66	14.66
24	UNIBANK	24.43	23.38	20.08	18.79	17.50	16.48	14.66	14.46	13.47	12.66	11.78	11.40	15.63	15.63
25	ZENITH	20.10	15.61	38.09	12.40	11.68	9.71	10.51	11.01	11.30	96.60	12.03	13.97	15.65	15.65

Source: Prudential returns of banks

Table 4.63: BANKS MONTHLY CAR FOR 2008

		JAN	FEB	MAR	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL	AVERAGE
1	ADB	16.91	16.70	18.90	17.93	17.68	16.74	21.59	20.44	15.15	14.74	19.26	63.57	18.93	18.93
2	AMAL	13.05	11.85	12.49	11.12	10.73	12.32	12.60	12.67	11.72	11.93	11.34	12.60	12.03	12.03
3	BAR			413.71	201.68	201.68	196.66	198.52	201.58	201.93	205.57	208.73	209.85	213.74	213.74
4	BBG	12.62	13.48	12.88	13.94	15.99	13.32	14.25	14.00	13.77	13.81	13.02	13.40	13.71	13.71
5	UT	31.93	29.46	27.96	27.03	24.86	22.36	20.88	19.77	16.49	16.49	16.49	31.07	22.75	22.75
6	BSIC				259.23	275.15	214.98	234.57	201.93	166.84	166.84	166.84	148.29	196.26	196.26
7	CAL	15.91	14.68	14.78	14.80	15.01	13.59	15.49	13.57	13.67	11.97	12.01	12.00	13.75	13.75
8	ECO	17.76	16.22	16.66	12.72	12.29	12.46	12.67	15.14	15.88	11.21	12.22	13.41	13.79	13.79
9	FAMB	13.00	12.45	12.54	12.40	12.26	13.67	10.46	11.78	11.34	10.46	10.68	12.04	11.11	11.11
10	FBL	11.06	13.27	13.52	12.79	13.31	14.00	13.33	12.20	12.81	11.10	10.86	11.31	11.23	11.23
11	GCB	13.31	13.45	14.11	13.18	11.28	11.46	12.56	12.18	11.95	10.18	10.68	11.13	11.99	11.99
12	GTB	25.67	20.64	19.15	14.29	12.50	12.25	11.31	11.31	11.31	12.13	12.13	11.47	13.15	13.15
13	HFC	15.67	13.29	13.07	12.36	11.95	18.53	19.73	19.52	19.58	20.23	12.47	12.85	15.62	15.62
14	IBG	10.66	10.78	14.92	12.64	11.80	10.71	10.13	10.08	10.11	10.05	20.56	10.01	10.72	10.72
15	ICB	23.65	20.42	26.44	23.21	21.84	22.38	22.58	20.67	20.00	19.62	19.62	19.62	20.21	20.21
16	MBGL	16.50	15.77	16.00	16.44	16.73	12.87	17.27	14.52	17.77	16.47	19.77	17.51	16.39	16.39
17	NIB	19.28	17.39	17.34	16.22	15.49	14.11	14.74	15.00	15.05	14.02	13.18	14.32	13.33	13.33
18	PBL	10.45	11.04	10.64	10.33	10.20	11.08	10.46	10.91	10.86	9.89	10.80	10.23	10.56	10.56
19	SCB	15.31	14.15	16.84	16.56	11.68	11.81	11.98	11.87	10.83	10.03	12.57	11.81	12.78	12.78
20	SG-SSB	18.47	19.82	18.60	15.99	17.51	15.95	15.31	18.24	15.41	17.26	17.26	17.03	17.13	17.13
21	STANBIC	14.07	14.12	13.55	12.94	12.67	13.55	15.03	13.70	13.68	13.63	13.63	17.90	14.07	14.07
22	TTB	12.39	11.72	11.11	10.83	11.53	10.87	10.35	11.20	10.29	11.76	12.21	12.45	10.54	10.54
23	UBA	11.34	10.57	64.19	16.51	16.51	17.52	16.46	14.16	14.11	13.84	14.01	12.16	13.55	13.55
24	UNIBANK	12.20	12.93	12.19	11.59	11.17	11.19	11.17	11.02	11.01	10.68	10.68	11.10	11.33	11.33
25	ZENITH	12.33	13.63	13.82	13.30	12.67	12.79	12.84	10.85	13.75	13.06	13.24	20.04	14.03	14.03

Source: Prudential returns of banks

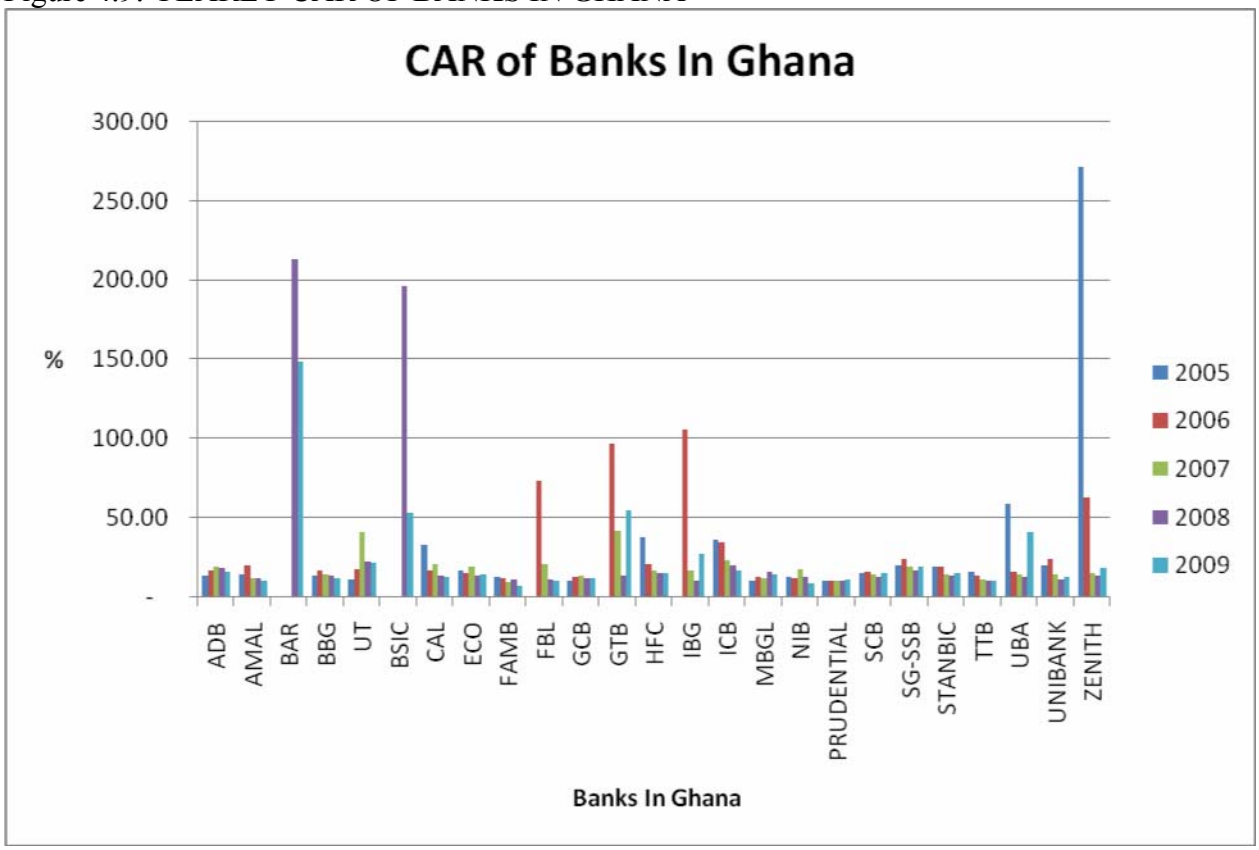
Table 4.64: BANKS MONTHLY CAR FOR 2009

		JAN	FEB	MAR	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL	AVER
1	ADB	16.06	15.68	16.77	16.77	16.63	16.61	16.09	16.40	15.96	17.42	16.04	14.83	16.27	16.27
2	AMAL	11.32	11.32	10.85	10.39	11.17	12.00	12.06	11.16	11.16	10.96	10.67	10.67	10.34	10.34
3	BAR	196.88	167.42	168.31	175.69	175.79	179.00	137.72	143.57	339.23	90.00	109.67	109.67	148.52	148.52
4	BBG	10.86	10.86	12.25	11.79	13.23	13.55	14.17	12.53	12.53	12.53	11.87	11.87	12.31	12.31
5	UT	30.85	30.04	23.46	24.08	21.24	15.70	15.70	15.70	15.70	15.70	11.85	11.85	21.65	21.65
6	BSIC	103.08	103.08	93.41	77.96	70.62	62.95	46.60	46.60	39.10	39.10	28.81	28.81	53.31	53.31
7	CAL	11.34	11.34	11.60	11.49	12.58	12.55	12.15	12.36	12.36	12.15	15.88	15.88	12.70	12.70
8	ECO	13.77	14.73	12.84	11.87	12.34	12.29	11.76	12.68	12.87	13.82	22.20	22.20	14.53	14.53
9	FAMB	11.78	11.78	10.02	7.24	8.15	6.82	6.39	6.39	6.39	6.50	10.62	10.62	7.60	7.60
10	FBL	11.48	11.25	10.21	10.08	10.06	147.80	10.02	10.03	10.03	10.01	12.19	12.19	10.43	10.43
11	GCB	12.50	12.49	12.18	12.30	12.94	12.73	14.23	8.69	11.74	11.81	13.59	13.59	12.38	12.38
12	GTB	79.31	79.31	74.01	74.50	66.38	45.98	45.98	45.98	45.98	45.98	48.46	48.46	54.65	54.65
13	HFC	17.22	17.22	15.77	16.46	15.50	15.10	15.09	15.40	15.40	14.43	15.52	15.52	15.68	15.68
14	IBG	10.03	10.03	9.27	9.11	9.17	12.48	12.47	12.47	12.47	83.57	83.57	83.57	27.56	27.56
15	ICB	18.29	17.23	17.60	17.14	17.52	20.85	17.70	19.52	19.34	18.61	18.61	18.61	17.27	17.27
16	MBGL	14.17	14.17	15.47	14.55	14.96	15.84	15.44	14.79	14.79	13.23	13.23	13.23	14.48	14.48
17	NIB	10.07	9.63	8.57	9.37	3.92	11.57	11.57	10.95	11.31	13.29	13.29	13.29	9.18	9.18
18	PBL	10.80	10.81	10.81	10.55	10.52	10.60	10.49	10.50	10.50	12.89	12.89	12.89	11.22	11.22
19	SCB	16.61	17.49	16.57	16.31	16.14	12.50	13.52	14.35	14.35	15.31	15.31	15.31	15.25	15.25
20	SG-SSB	17.08	17.08	17.11	15.92	18.76	18.66	20.81	20.81	20.81	20.81	20.81	20.81	19.08	19.08
21	STANBIC	17.46	17.46	15.80	14.98	14.50	14.56	14.56	14.46	14.46	14.46	14.46	14.46	15.12	15.12
22	TTB	12.42	11.95	11.71	11.91	11.63	12.09	11.62	11.58	11.58	11.58	11.58	11.58	10.87	10.87
23	UBA	12.07	12.07	10.97	10.14	9.81	8.72	40.76	80.52	80.52	76.12	76.12	76.12	40.99	40.99
24	UNIBANK	10.60	10.60	15.09	15.08	14.07	13.48	12.34	12.34	12.34	12.34	12.34	12.34	12.76	12.76
25	ZENITH	23.51	23.28	22.21	17.50	15.67	15.99	15.34	14.29	14.29	20.86	20.86	20.86	18.30	18.30

Source: Prudential returns of Banks

The above tables contain monthly computed CAR for the twenty-five banks used for the purpose of the study. The blank spaces on the tables simply mean that the banks were not in existence for those periods or had not been licensed. The tables again show that the CAR of seven (7) of the banks fell below the statutory limit of 10% during the period. However in all cases the CAR normalises before the end of the year. The yearly averages were therefore unable to capture the violations unless the weight is so severe to down the positive of the earlier years. Out of the seven two of the Large Group Banks (GCB & BBG) suffered a violation for maximum of four months in 2005 due mainly to deterioration in their Non Performing Loans (NPLs). Also three of the Medium Group Banks (ADB, MBG & NIB) suffered a dip in 2005 for maximum of three months in 2005 due to deteriorating NPLs. PBL violated the statutory CAR for six (6) months in 2006, and once in 2008. NIB again violated the statutory CAR for four (4) months recording the lowest ever of 3.92% in May 2009. FAMB also violated the statutory CAR for seven (7) during the same year. The violation of the CAR for 2009 was so severe that it affected yearly average at the close of year. The yearly average of CAR during the period is summarised in the graph below:

Figure 4.9: YEARLY CAR OF BANKS IN GHANA



4.3.6 STRESS TEST

The results of a stress test conducted by the monetary policy committee in Ghana in July 2009 largely showed that industry is collectively solvent and supported the preliminary findings of the study. The stress test was based on the following assumptions:

$$CAR_b^S = \frac{RC_b + \Delta^S RC_b}{RWA_b + \Delta^S RWA_b}$$

Where:

CAR_b^S : stressed capital adequacy ratio of bank b under stress test S;
RC_b : the regulatory capital of bank b, including retained profits;
RWA_b : the risk weighted assets of bank b;
$\Delta^S RC_b$: the impact of stress test S on regulatory capital of bank b (typically negative); and
$\Delta^S RWA_b$: the impact of stress test S on risk weighted assets of bank b.

The test was modified to assume that un-retained profits were available to absorb profits.

$$CAR_b^S = \frac{RC_b + \Delta^S RC_b + URP_b}{RWA_b + \Delta^S RWA_b}$$

Where:

URP_b : unretained profits of bank b.

The test was conducted to test credit risk being the dominant risk factor based on a provisioning approach to see the effect on CAR. The results are as follows:

Table 4.65

100% of OLEM become SUBSTANDARD

	BANKS	BASELINE CAR	STRESSED CAR
1	NIB	11.57	8.05
2	SG-SSB	20.03	19.92
3	MBG	15.44	11.47
4	CAL	12.15	11.93
5	TTB	11.62	11.23
6	FAMB	5.47	5.02
7	UTB	22.05	21.86
8	PBL	10.49	10.24
9	ICB	17.70	17.69
10	STB	14.56	14.04
11	AMAL	12.06	11.96
12	UNIBANK	13.31	13.30
13	HFC	15.09	14.88
14	UBA	40.76	40.74
15	ZB	15.34	15.30
16	GTB	51.72	51.71
17	FBL	10.02	9.58
18	IBG	11.84	11.56
19	BAR	137.72	137.72
20	BSIC	56.52	56.43
	SMALL BANKS	15.62	14.79

Table 4.66

100% SUBSTANDARD become DOUBTFUL

	BANKS	BASELINE CAR	STRESSED CAR
1	NIB	11.57	8.33
2	SG-SSB	20.03	19.91
3	MBG	15.44	13.08
4	CAL	12.15	11.71
5	TTB	11.62	11.26
6	FAMB	5.47	4.67
7	UTB	22.05	20.07
8	PBL	10.49	10.18
9	ICB	17.70	17.54
10	STB	14.56	13.36
11	AMAL	12.06	11.80
12	UNIBANK	13.31	13.27
13	HFC	15.09	14.58
14	UBA	40.76	40.71
15	ZB	15.34	15.30
16	GTB	51.72	51.70
17	FBL	10.02	9.96
18	IBG	11.84	11.78
19	BAR	137.72	137.56
20	BSIC	56.52	56.44
	SMALL BANKS	15.62	14.85

Table 4.67

100% DOUBTFUL become LOSS

	BANKS	BASELINE CAR	STRESSED CAR
1	NIB	11.57	7.02
2	SG-SSB	20.03	19.64
3	MBG	15.44	13.05
4	CAL	12.15	11.32
5	TTB	11.62	11.60
6	FAMB	5.47	3.79
7	UTB	22.05	11.07
8	PBL	10.49	10.02
9	ICB	17.70	17.19
10	STB	14.56	10.11
11	AMAL	12.06	11.66
12	UNIBANK	13.31	13.29
13	HFC	15.09	14.61
14	UBA	40.76	40.27
15	ZB	15.34	15.25
16	GTB	51.72	51.63
17	FBL	10.02	10.00
18	IBG	11.84	11.33
19	BAR	137.72	137.72
20	BSIC	56.52	56.52
	SMALL BANKS	15.62	14.18

4.3.7 SUMMARY AND CONCLUSIONS OF SECONDARY DATA

The foregoing suggests that all the three groups exhibited common characteristics in many respects. The risk factors of the banking industry were very much correlated and exhibited granger causal relationships. This means that past events

of the risk factors were significant and useful in forecasting the future events of one another. It was also observed that the large and medium group banks had fairly stable CAR, whilst the small groups were not stationary mainly as a result of the number new banks licensed during the period. Also whilst on the average all the groups complied with the statutory CAR of 10% and the prudential buffer of 13%, the MGBs on a few occasions recorded a minimum CAR of 9.2% below the statutory limit. This means some of the MGBs were technically insolvent during those periods (so long as CAR is used as the sole measuring rod). Again the SGBs recorded the highest CAR of 29.4%. This is because most of the newly licensed banks which are characterized with big CARs fell in this category. A newly licensed bank would do little intermediation in the beginning until it stabilizes.

On the whole the Ghanaian banking system was found to be solvent as far as CAR is concerned and based on the secondary data collated and analyzed for the period. This was corroborated by a stress test conducted in July 2009 by the Bank of Ghana.

4.4 HYPOTHESIS TESTING

4.4.1 STATEMENTS OF HYPOTHESIS

Two hypotheses were identified for the purpose of the study.

The Null Hypothesis (H_o):

1. Ho: Systemic risk of financial institutions can be effectively measured.

2. Ho: The framework of capital adequacy ratio of financial institutions should include systemic risk.

The Alternate Hypothesis (Hi):

1. Hi: Systemic risk of financial institutions cannot be effectively measured
2. Hi: The framework of capital adequacy ratio of financial institutions should not include systemic risk.

The hypothesis of the primary data was tested using chi square test as the test statistic at a significance level of 5%. The secondary data was tested based on multiple regression analysis, granger test analysis and Augmented Dickey Fuller 't' statistics test statistic at a significance level of 5%. The multiple regression and the granger causality tests were considered more appropriate because the study was more focused on the correlation of the risk factors amongst themselves and the dependent variable (CAR); the causal effects of the relationship of the variables (both dependent and independent) and the effects of changes in the dependent variables on CAR.

4.4.2 TESTING AND ANALYSIS OF HYPOTHESIS

The hypothesis was tested based on the supposed relationship identified among risk factors. The following equation is therefore considered to determine the relationship among the variables:

$$CAR_{it} = c + \beta_1 CR_{it} + \beta_2 MR_{it} + \beta_3 PR_{it} + \varepsilon_{it}$$

Where $\beta_1 = \beta_2 = \beta_3 \rangle 0$

i =1,2,…,n is category of firm i

t =1,2,…, T is time (monthly)

The study supposed that the risk factors interact and the interaction could create additional risk factor. The ordinary multiple correlation results of table 4.39 clearly demonstrated the relationship amongst the risk factors. Again table 4.41- 'General' on granger causality showed that CR, the largest risk factor granger causes MR and PR, meaning past events of CR could explain future events of MR and PR, thus the growth and interaction in the factors could be explained. The two results therefore supports Null hypothesis 1. The first null hypothesis was tested based on results of a chi square test as the test statistics at 5% significance level. The chi squared test was chosen mainly because the primary data was non parametric. The second null hypothesis is simply explained from results of table 4.43 of the 'augmented 't' statistics' which at a significance level of 5% showed that the CAR would not be stable or stationary if the risk factors are varied. It also means that since there is an inverse relationship with the risk factors any addition to risk factors or increase to the coefficients will negatively affect the CAR and therefore will force banks to increase their capital based on their risk appetite to meet the statutory requirement of 10% or at best be within the buffer of 13%. This thus upholds the second null hypothesis which states that systemic risk could be measured under the CAR framework. This is depicted in the modified ratio below:

$$CAR_{it} = c + \beta_1 CR_{it} + \beta_2 MR_{it} + \beta_3 PR_{it} + \beta_4 S_{it} + \varepsilon_{it}$$

Where $\beta_1 = \beta_2 = \beta_3 = \beta_4 \rangle 0$

i =1,2,…,n is category of firm i

t =1,2,…, T is time (monthly)

where 'S' is the systemic risk charge.

4.4.3 CONCLUSION

The chapter shows the results of the study have upheld the hypotheses (1 & 2) at the proposed level of significance of 5% using chi squared test for the primary data analysis and the 'augmented 't' statistics' for the secondary data analysis..

4.5 CHAPTER CONCLUSION

The analysis of both the primary and secondary data strongly suggests that the Capital Adequacy Ratio (CAR) framework is very crucial in the measurement of risk in the financial system. The primary data analysis particularly suggested that systemic risk is very crucial in the financial system and that the CAR framework could be adopted for its measurement. The analysis again overwhelmingly suggested that the players of the financial system would not want the financial market to be rescued by the tax payers' money in case of any financial turmoil, rather they subscribed to creating their own buffer of funds to rescue themselves.

On the other hand, analysis of the secondary data showed a less vulnerable financial system which was almost solvent as far as the main statutory solvency requirement was concerned. The causal relationship among the risk charges was also underscored the assertion that there is a strong relationship among the risk charges. On the whole the analyses of the primary and secondary data have overwhelmingly supported the status quo (Hull hypotheses) of the study.

CHAPTER FIVE

5.0 SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

The chapter summaries the major findings of the study, draws conclusion based on the findings and finally make recommendations to solve the problems identified. It again discusses the limitations of the study and highlights areas for further research which were either not conclusive for this study or are beyond the scope of the research. It again acknowledges research materials (in the form of articles, journals, books, news publications etc.) used in the bibliography. Finally all correspondences in connection with the study have been detailed in the chapter.

The study principally sought to address the issue of identification, measurement and control of systemic risks and its effects in the financial system of emerging countries including Ghana. It again sought to ascertain the incorporation of systemic risk into the capital adequacy ratio (CAR) framework. It also sought to establish the effect of the relationship between CAR and the traditional risk factors on one hand, and the causal relationship amongst the risk factors. An ordinary correlation and granger correlation was therefore established on the following equation:

$$CAR_{it} = c + \beta_1 CR_{it} + \beta_2 MR_{it} + \beta_3 PR_{it} + \varepsilon_{it}$$

Where $\beta_1 = \beta_2 = \beta_3 = \beta_4 \rangle 0$

$i = 1, 2, \ldots$ n is category of firm i

$t = 1, 2, \ldots$ T is time (monthly)

Where 'CAR' denotes the Capital Adequacy Ratio, the 'CR' is the credit risk factor, the MR is the Market Risk factor and the 'PR' is the operational risk factor.

To derive the appropriate relationship among the risk factors, the traditional risk factors are expected to interact among themselves and which as a result is expected to produce an additional risk factor – 'systemic risk'. The ratio shall therefore be depicted as per below:

$$CAR_{it} = c + \beta_1 CR_{it} + \beta_2 MR_{it} + \beta_3 PR_{it} + \beta_4 S_{it} + \varepsilon_{it}$$

Where $\beta_1 = \beta_2 = \beta_3 = \beta_4 \rangle 0$

i =1, 2,…,n is category of firm i

t =1,2,…, T is time (monthly)

where 'S' is the systemic risk charge.

Where 'S' denotes the systemic risk factor. The systemic risk charge is expected to grow at a rate faster than the other risk factors and therefore makes it more potentially devastating than the other risk factors.

5.2 SUMMARY OF MAJOR FINDINGS

The study revealed the following findings:

- That the foreign banks had better risk management functions than the domestic banks in Ghana. This was revealed after a cross tabulation of the results as per frequency table 4.2. This was mainly due to the fact that foreign banks usually derive the structure of their risk management control functions from their parent companies who already have well established and efficient risk management practices. The data however did not reveal a wide gap between the two groups as the domestic banks have fairly basic but reasonable risk management structures for the banking system in Ghana.

- The results of the primary data gave credence to the assertion of the first null hypothesis that the risk factors interact among themselves. Again industry players overwhelmingly supported the assertion that systemic risk is very crucial and hence must be separately identified, measured and controlled. The

results further supported the assertion that the additional risk factor- 'systemic risk' produced by the interaction of the traditional risk factors must be incorporated into the Capital Adequacy Ratio (CAR) framework. The results as shown in tables 4.31 and 4.32 supported these assertions. The foregoing again directly corroborated the second null hypothesis and was further confirmed by the results of the chi squared test of tables 4.38 and 4.39 which gave a positive residual to the assertion.

- The results of table 4.22 did not support the assertion that capital charge for systemic risk could prevent banks from becoming systemically important. However frequency table 4.14 supported the assertion that financial institutions should include capital charge of systemic risk based on their systemic importance. This was again confirmed by the positive residual of the chi squared test of observed values over the expected as per table 4.39. It means therefore that though the study did not support the idea that the incorporation of capital charge could prevent banks from becoming systemically important it overwhelmingly supported the view that the computation of capital charge should be based on systemic importance of the banks for it to be meaningful.

- The results of the study as shown in frequency tables 4.19, 4.20 and 4.21 also indicated that banks' and other financial institutions would definitely be bailed out irrespective of whether they take bad decisions or not, provided they are of systemic importance. It indicated however that, financial institutions would not subscribe to being rescued with the tax payers' funds, but would rather want to create their own funds for their rescue in case of any eventuality. These assertions were also confirmed by the positive residual results of the Chi Squared test as per table 4.41.

- The results of the primary analysis as depicted on frequency tables 4.15 and 4.16 shows that the non deposit taking financial institutions develop products

similar to their counterparts in the deposit taking category. It also strongly showed that capital charge for risk as per the capital adequacy framework should be extended to the non deposit taking financial institutions. This outcome was also confirmed by the results of the Chi Square tests in table 4.40 which showed a positive residual of 34.6 of observed values over the expected.

- The results of the secondary data analysis of figure 1 showed that credit risk was the dominant risk charge in the Ghanaian banking system. Though this partly suggests that the Ghanaian banking system is typically rudimentary and lacks sophistication, especially in derivatives and other sophisticated market risk products, the results may be misleading since some of the banks; especially the foreign related ones have lately been involved in complex products including derivatives, no matter how small and infrequent they are, but have failed to appropriately disclose them. Most of them however do not inform the central bank about them because the mandatory prudential returns only required them to give information on forward foreign exchange transaction and swap foreign deals. These are but limited and rudimentary derivatives that banks engage in. The onus is thus on the central bank to either modify or redesign its prudential returns to capture such sophisticated derivative products which the banks especially the foreign ones have availed themselves to.

- The analysis of the secondary data generally showed a less vulnerable financial system which could be described as relatively solvent as far as capital adequacy ratio (CAR), the main statutory solvency measure, is concerned. However, the detailed monthly individual bank specific analysis revealed that some of the banks over the period did not comply with the statutory CAR requirements. For instance two of the banks from the large and small groupings respectively, did not comply with the requirement in 2009 even though the industry as a whole did comply and appeared solvent. The

causal relationship among the risk charges also underscored the assertion that there is a strong relationship among the risk charges thus confirming the second null hypothesis. The research results on the banks solvency was corroborated by a recent stress testing of the banking industry conducted in July 2009 on the banks by Monetary Policy Analysis and Financial Stability Department (MPAFSD) of the Bank of Ghana.

- The results of the secondary data analysis again showed that the charge for operational risk was negligible, given the volume of operations of the banks, though it showed a gentle rising trend. The operational risk (PR) was paradoxically based on the gross income of banks. This means that it is assumed that the income of banks is directly proportional to operational risks of banks. This indeed may not be true since banks especially investment banks may make huge sums of money without necessarily going through cumbersome and complicated operational activities. Again in Ghana Operational risk is based on net income which means that banks and especially start-up banks which are making losses due to systems breakdown or failure or corrupt practices of persons in positions of trust, will rather not be charged anything or be charged less since the net income would either be small or may not be available when the bank or institution make losses. The operational risk (PR) was again based on the audited accounts of banks, therefore start-up banks were not charged until after a whole year after the audited accounts have been finalised. This means during start-up periods, monthly capital adequacy ratio calculation will be misleading as nothing would be allocated for operational risk. These findings generally mean that based on the assumption that the banks would later on make profits, the average income for the purpose of computing capital charge for operational risk would be relatively low for a period of three years. Again the start-up years are always characterised by losses and would therefore not attract charges though frequent breakdowns and losses are usually incurred during such periods due mainly to teething problems. This was evident in the analysis

of operational risk charge in all the grouping levels. It was evident from figure 4.2 that even though operational risk generally showed growth for each calendar year, the growth rate was less steep in years when existing banks made losses and (or) during start-up years when the banks had been newly licensed.

- In summary the secondary analysis suggests that though Operational risk charge is a charge against losses the charge rather reduces when banks make losses or during the start-up years when the banks were rather considered inexperienced and more likely to face teething problems including fraud and system breakdowns.

- The secondary data analysis results of figures '1' and '2' also showed that the market risk charge was relatively low and did not reflect the growing market risk activities such as derivatives including, swaps of all kinds, proprietary trading etc, which have emerged in the operations of some banks in Ghana in recent times. Again, the charge for market risk was solely based on the volatilities of exchange rates with respect to positions (Long or Short) taken by the banks. The liberalisation of the economy involving free and transparent money market system has generally impacted on the market risk factors involving commodity risk, interest rate risk (such as gap risk, yield curve risk, etc), in addition to exchange rate risks. For instance the money market in recent times has witnessed sharp volatilities of different proportions in interest rate of the various money market instruments with different maturities. For this reason disparities have been realised in the yield curves and banks had had to deal with huge gaps etc, yet the risk associated with these money market activities involving interest rate have not been captured anywhere in the capital adequacy ratio framework in Ghana. Again though most of the banks were involved in the cash crops financing (warehousing finance) such as cocoa, coffee, cotton etc, which are usually used for the valuation of these commodities as security for facilities obtained, the changes in the prices of

these commodities being traded did not reflect in the capital adequacy framework. The argument had been that these products are not actively traded in Ghana. However, cocoa board which is basically performing warehousing receipt activities are most often granted facilities based on their warehousing receipts and the banks sometimes use these receipts to secure short term funds on the inter-bank markets. The volatilities of the world prices of cocoa would therefore have serious impact on the warehousing receipts of cocoa and cocoa financing in general since the receipts which are usually used as collateral by cocoa board are sometimes privately traded by the banks. The risks associated with the volatilities in commodity prices in the form of warehouse receipts (which are sometimes used by some of the banks as collateral on the interbank market) must be accounted in the capital adequacy ratio framework. The secondary data analysis of the market risk charge was also corroborated by the results of the primary analysis of frequency table 4.28 which asserts that the derivative market should be highly regulated irrespective of whether they are used for hedging or for speculative purposes. The results of this assertion partly exposed the inadequacies of the capital adequacy ratio for not capturing the liability side of the balance sheet. This was further confirmed by the Chi Squared test which had a positive residual of 5.7 and 15.7 of observed values over expected values of responses of 'strongly agree' and 'agree' respectively.

- The prime or policy rate (which is the rate at which the banks are expected to borrow from the Bank of Ghana on the money market operations of the financial system) was found to have had little impact on the market, and for that matter, market risk because banks in Ghana over the years rather had had to lend to government than borrow from the government due mainly to governments perpetual deficit financing budget programmes. The prime or policy rate therefore does not feature in the pricing of the banks' products and therefore not effective in that regard. Banks rather base their base rate and other product pricing on the Treasury bill rate and other government papers since government has almost always been on the market borrowing from the

public through the banks and (or) from the banks themselves. It is mainly for this reason that banks and other financial institutions in Ghana are almost irresponsive of the prime or policy rate monetary tool mechanism when it is reduced. In a situation like this the banks rather positively react to moral suasion of the Bank of Ghana to move in line with government policy direction. The irony however is that the banks swiftly react to the policy rate when it is increased by the Bank of Ghana. This area of the findings is beyond the scope of the study and may have to be escalated beyond this study for further analysis.

- From the literature review it was evident that Basel II did not address the issue of systemic risk even though it was mentioned on numerous occasions in the document. The closest the Basel II document went in associating with systemic risk was found in the operational risk framework. Basel II defined operational risk as "…the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events." The last phrase in the definition "systems or external events", sounded as though it sought to address the big question of systemic risk. However, in a reaction to public outcry over the definition of operational risk, which was considered as lacking clarity and too "omnibus", the committee confirmed in the revised version of the September 2001 Basel Accord that it did not intend the definition to comprehend systemic risk. In other words, systems and external events mentioned in the document had nothing to do with systemic risk. This leaves systemic risk measurement completely out of the Basel framework, though it is highly recognised and mentioned several times in the accord. To further concretise the confirmation of the non-recognition of systemic risk as part of operational risk, it would be realised that none of the measurement criteria of operational risk, be it Basic Indicator, Standardized or Internal Model or Advance approaches did measure systemic risk of banks or more importantly, establish the relationship with the other risks factors. To this end, it is clear that the attempt to put some weight on operational risks by the

Basel Committee by isolating it from credit risk still leaves unanswered the question of systemic risk.

- The secondary data analysis of the study revealed that some banks, especially, the Large Group Banks (LGBs), comprising Ghana Commercial Bank, Ecobank Ghana Limited, Standard Chartered Bank Ghana Limited and Barclays Bank Ghana Limited have become systemically important or too-big-to-fail to the banking system in Ghana. The foreign banks, especially Standard Chartered Bank Ghana Limited and Barclays Bank Ghana Limited on the contrary constitute small fractions to their parent banks and host countries and are therefore not-too-big-to-fail to them. They therefore could easily be disposed of by their parents if the banks solvency is threatened on the domestic market and the reason for establishing them ceases to be relevant to the parent probably due to a change of their strategic focus. Contrary to the little effect a decision like this may have on the operations of their parents and the banking system of the home country, the abrupt dissolution of such banks in the Ghanaian banking system due to insolvency could have untold consequences to the entire banking system in Ghana, if not properly planned and executed. The question is if the foreign Large Group Banks (LGBs) could easily fold up in emerging countries and for that matter Ghana, what measures have these countries put in place to curb their effect? Secondly how are emerging countries like Ghana dealing with domestic banks which have assumed systemic importance like the Ghana Commercial Bank? It is clear from the literature that the prudential guide in Ghana which ensures banks do not place more than a hundred percent of their net-worth into their nostro account with anyone bank is not enough and not effective as it is just a prudential guide not backed by law. Besides, the too-big-to-fail foreign banks whose presence is potentially injurious to the financial system are the worst culprits. They always succeed in making an argument of 'convenience', in that, doing business with their parents is more convenient and therefore they would simply not find it reasonable placing funds with other competing banks.

Plausible though as this may seem to the foreign banks it cannot be upheld by any serious risk conscious financial system or country as the total risk of the system or the country cannot be subordinated to individual banks' 'convenience'.

- It has most often been argued that foreign banks would not allow their reputation to be dented by allowing their subsidiaries to collapse and therefore would do everything possible to salvage their subsidiaries in the domestic markets. Much as this argument sounds cogent and reasonable it may not necessarily be the case as the parent bank themselves may, in times of crisis, need to be rescued by their governments in their respective countries and hence would need to 'trim off their branches' to remain in business. In cases like this, the foreign subsidiary banks in the local or host countries would be left to their fate and may have to rely on their respective governments and (or) deposit insurance companies to come to their rescue. It is for this reason that the study considers the establishment of Deposit Insurance Institutions in emerging countries as crucial. It has been argued that deposit insurance schemes breed moral hazards in banks; in other words, banks may know they have a fall back and so may act recklessly or take on undue risk. This argument has seriously been countered by the proponents of deposit insurance who in a nut shell believe that the advantages of establishing deposit insurance to salvage depositors in case of bank failures, far outweighs the disadvantages. The careful crafting of an insurance scheme could help in cushioning the risk of the industry. This area of the findings is however beyond the scope of this study and has thus been escalated for further research.

- The study revealed that systemic important banks shall be rescued whether they have taken bad decisions or not and their rescue shall not be subjected to any conditionality. As noted in the preceding paragraph banks shall pose systemic risk when they become systemically important (based on size, level of connectivity etc.) to the economies of their countries and to the world at

large. (Persaud & Spratt, 2005). Having become "too-big-to-fail" they defy all forms of conditionality for rescue should they fall into problems. It has been argued by many, including renowned financial practitioners and key researches in the academia, that when banks take bad decisions leading to solvency problems they should not be rescued. The question has been whether banks, including systemic important ones, should be salvaged by central banks and governments in the face of imminent collapse irrespective of whether the problem was due to their own folly and recklessness or as a result of uncontrollable system failure. This debate have been found to be more theoretical since no government shall institute conditions to a rescue package and have the 'nerve' to wait till the bank or institution meets the conditions before it rolls out a rescue plan when there is imminent danger of collapse. It is for this reason that the debate over the initial decision by the Governor of the Bank of England (Mervyn King) not to salvage the Northern Rock Mortgage bank in the United Kingdom (U.K) in the wake of the sub-prime mortgage debacle (escalating into the 'global financial crisis') emanating from the United States of America (U.S.A) was found intriguing. "…Mr. King also reportedly clashed with the Financial Services Authority over their desire for early intervention to help Northern Rock Mortgage Bank. Mr. King had previously warned the banks that they were accumulating too many bad risks and that it would not be the business of the Bank of England to bail them out." (BBC News 20th Sept. 2007). It is clear from the foregoing that systemic important banks pose a danger to the financial system and must be monitored closely since the system cannot afford not to salvage them neither could they subject their salvaging to conditions when faced with serious financial crisis.

- The study again revealed that banks and other financial institutions in emerging countries, including Ghana do not conduct stress testing to their system. The banks in Ghana were now being introduced to stress testing by the central Bank of Ghana to formally include it in their risk management practices. The results of a sample stress test conducted by the Monetary Policy Analysis and Financial

Stability Department (MPAFSD) of the Bank of Ghana on behalf of the Monetary Policy Committee of Ghana in July 2009 largely supported some of the findings of the study; that is, banks in Ghana collectively were found to be solvent but a disaggregation of the data revealed individual technical insolvencies of at least two of the banks in the Medium Group Banks (MGB) and Small Group Banks (SGB) respectively. The test which was a simple sensitivity (what if) analysis, first involved analyzing the effect on the industry should all loans in the OLEM category suddenly moved into the substandard category. The second involved analyzing the effect on the bank if all substandard loans suddenly become doubtful and finally analyzing the effect on the bank if doubtful loans suddenly become loss loans. The results of other forms of testing involving the total default of a single largest customer also revealed intriguing results with Ghana Commercial Bank becoming the worst affected should Tema Oil Refinery (the only oil refinery of the country) go burst. It revealed that the Ghana Commercial Bank (GCB) cannot but go burst if TOR goes burst.

- It was also found that the Bank of Ghana did not escalate the stress test to the macro level, that is, extend the test to the industry by analyzing the effect of the collapse of any one of the banks on the system as a whole. For instance should Ghana Commercial Bank (a large bank) collapse, what would be its effect on the system as against a collapse of First Atlantic Merchant Bank (FAMB) or The Trust Bank (TTB), which are very small banks? Stress test escalated to the macro level would be very useful to the policy makers of the economy as it gives a snapshot of the resilience or vulnerabilities of the banking sector and its repercussions on the total economy of countries including Ghana. It was also realized that stress test was not applied to sectors and their effect on the financial system. If for instance, as a result of poor weather conditions the agric sector under-performs, what would be the effect to the financial sector? Again if the Government of Ghana decides to ban the exportation of round logs when only few companies could process the timber locally to meet international standards, what would be the effect on the financial sector and the economy as a whole? Since these linkages could go on and on, the most important ones must be

considered and analysis made on its effect on the economy to enable the policy makers to take accurate and effective policies.

- The study again revealed that central banks of most emerging countries including the Bank of Ghana do not have documented contingency plans to rescue banks in case of any eventuality. Though the Banking Act, 2004 (Act, 673) as amended makes a provision for problem resolution of banks including appointing a conservator when there is leadership crisis, there is no written guideline. Also if the crisis or problem of the banks or institutions is mainly due to liquidity or solvency challenges and not necessarily due to incompetent or not-too-good leadership, advancing of temporary credit to such banks would rather be required and not change of leadership or management. However the Bank of Ghana does not have approved contingency document or guideline as to how the banks should be rescued if they were faced with solvency crisis. It is expected that the guideline would be structure to involve how the crisis would be managed by the central bank, and what action would be appropriate for what challenge. For instance, the Bank of Ghana recently rescued one of the medium size banks by advancing temporary credit to the bank. However is it in all cases that the Bank of Ghana would have to advance credits? Could there be instances where the bank would have issued out bonds to clean the balance sheet of banks as it did to salvage one of the biggest Commercial Banks in Ghana when it was faced with imminent collapse due to the huge accumulated debts of a single customer in the oil business? All these are different ways and strategies that could be employed depending on the circumstance or the problem on hand. But the question is, without a blueprint would the authorities or the policy makers apply the appropriate strategy or be consistent in the strategies that they apply? The financial system is so important and fragile that one could not afford to use ad hoc measures or try-and-error to handle it. Any mistake will bring down the whole financial system and hence the whole economy of the country. The economies of most emerging countries are so fragile that the call for a well structured policy direction and action to manage them. If contingency and (or) continuity plans have been successful at the micro level, that is, have been

effectively used to manage institution specific operational challenges, why can it not be escalated to the macro level.

- The study again revealed that by allocating a charge for systemic risk, a hidden reserve would be created and this could serve as a buffer or cushion to absorb systemic risk. This revelation is in line with the concept of counter-cyclicality and financial crisis. The proponents of pro-cyclicality are of the view that banks would do good business in good times when the economies are booming and reduce business or cut credits when business is bad. This is in line with the view that if business is bad, credits granted would naturally not be paid back and hence the probability of default (PD) would be high in periods of slum. The action of banks and other financial institutions in this regard however is found to worsen the cyclical problems of economies of countries since banks would fund projects during booms and reduce funding during slums (when advances are rather needed to stimulate the economy). It is for this reason that stimulus packages are introduced by governments to stimulate the economies in periods of crisis or recessions. However, instead of one off stimulus package (from the tax payer) injected into the financial system by governments in times of crisis, a permanent systemic charge would be more appropriate in serving as a counter cyclical measure. It would serve as a buffer especially in bad times when banks need support and therefore might not be able to give adequate and appropriate credits to revamp an economy in crisis. It has been proven beyond measure that a bank with enough reserve is more resilient than a bank with little reserve. Again instead of having to appropriate the tax payers' funds to stabilise the banks and the system as a whole, banks would rather have to build up their own buffer against such eventualities. A charge for systemic risk creates an additional buffer which could make banks and other financial institutions less vulnerable to systemic risk in times of global crisis.

5.3 CONCLUSION

- On the whole the foregoing (primary and secondary data as well as the relevant literature reviewed) suggests an overwhelming support for the hypotheses put forward by the study. It generally showed that banks would not want to 'fail' or collapse at any point in time in their business lives. They would also not want to be rescued by governments or by the tax payers if they could help themselves by creating a fund. The results again generally point out the willingness of managers of banks in Ghana to put aside funds for the sole purpose of maintaining sanity and absorbing occasional shocks or cyclical upheavals in the financial system; and since from the study banks would wish to handle their own insurance, they overwhelming supported creating a charge for systemic risk. The results again show that majority of the respondents who supported the null hypothesis of the study were knowledgeable professionals in the relevant fields who, in addition, have deep knowledge in financial risk and risk management practices in general. It also turned out that risk management principles have been overwhelmingly accepted by the Ghanaian banking players, be it banks with foreign affiliation or purely domestic banks. However the degree of effectiveness skewed more to the foreign banks. Again the adoption of the capital adequacy ratio (CAR) to measure systemic risk received massive acknowledgement by the respondents.

- The study found systemic risk as not only crucial for the banking industry but as risk which must be viewed within the whole spectrum of financial and non financial system. The global credit crisis did not only collapse banks and other financial institutions but other non financial institutions including automobile companies, telephony companies etc. It was also found that systemic risk did not only contribute to the recession in most developed countries but completely shattered the economy of Iceland, a sovereign state. To curb the recession, governments of these countries had to establish rescue or stimulus packages to reverse the trend and subsequently put the economies on the path of growth. It is therefore evident that the assertion that banks should not be rescued if they take bad decisions (Sir Edward George, 1994, Mervyn King 2006, Mishkin, 2007) is vein threat which is not tenable. Again rescue packages involving emergency

liquidity injection based on collateral as expressed in the "Liquidity Insolvency Theorem" propounded by Eichberger and Summer, 2004 would equally be difficult to implement as risks which have assumed systemic dimensions do not give room for conditions. Conditions are only invoked in a normal system where there is no imminent danger to the one invoking the conditions. In situations of crisis however the salvaging of the financial system and the economy as a whole is paramount.

- The decision of Mervyn King not to salvage banks, particularly, Northern Rock based mainly on the question of the 'moral hazard' that it might create has over the years been shared by many, including the previous Governor of Bank of England, Sir Edward George, Frederic Mishkin (Chairman or the Federal Reserve Bank, New York) and even the Bretton Woods Institutions such as the International Monetary Fund (IMF) and the World Bank. The general view has been that when banks get the impression that they could be salvaged anytime they were in trouble they would not be careful in their dealings and would end up creating trouble to the financial system. Sir Edward George, 1994 noted that the term "Lender of Last Resort" (LOLR) can be confusing. He states "…the role of the central bank is not to prevent each and every bank from failing and that it is necessary for maintenance of the health of the banking system that there is a possibility of bank failure." This view was shared by Mishkin, 2007 who noted that no country is impervious to crises and that the need for 'Lender of Last resort' remains strong or important in restoring sanity or stability to crises stricken financial systems. He was, however, quick to add that by Lender of last resort (LOLR) "I mean short-term lending on good collateral to sound institutions, when financial market temporarily seize up. I do not mean rescuing financial market participants from the consequences of their bad decisions by lending to unsound institutions with little capital thereby postponing the recognition of insolvency." Much as temporary liquidity and 'lender of last resort' in general could be executed with conditionality, the conditionality should not take precedence over the health of the system. It is obvious from the recent rescue packages of

governments of the nations seriously affected by the global financial crisis that the question of collateral or whether bad decisions have been made by financial institutions being rescued was out of the question; what was really important was the effect the banks being rescued might on the countries and for that matter, the restoration of the health of the financial system. Unlike assessing a loan request or a business plan for the granting of a facility at the institution level for which most banks may reject a request as a result of a bad business proposal, rescue packages or salvaging an institution is done whether the institution likes it or not. The salvaging of the bank or institution is not negotiable provided its size and complexities of operations could run down the whole economy if it is left to collapse. Most of the financial institutions which were rescued through stimulus packages instituted by the governments of the affected nations had taken bad decisions, however for good reasons (including the size and complexities of their operations) they had to be rescued to halt or curb the crisis. Freddy Mac and Fanny Mae mortgage finance institutions which were at the central point of financing the subprime loans got rescued by the US government not because they were quasi government institutions and therefore could not be allowed to fail but because their failure would adversely affect the health of the American economy and the global financial system as a whole.

- Globalisation has been hailed by many as a blessing, though other believed they would be better off with little international influence. It is also apparent that as a result of liberalisation and globalisation, cross-border activities in most emerging countries like Ghana have intensified thus increasing the negativities associated with cross-border activities. Whatever the case, no country can develop in a closed system, that is, without any interaction with the international world. The global financial crisis affected countries which were very much interdependent and very much involved in cross-border activities. Though it is true that most emerging countries especially from Africa were not directly affected by the global economic crunch due mainly less interdependency of the emerging markets and the development ones the story would have been very different and devastating if

the opposite had happened. Emerging countries like Ghana would have gone aground like Iceland. This is because they would not be able to inject stimulus packages to their economies. Even the after-shocks of the global economic crunch have had untold consequences on emerging for which Ghana is no exception. Restricting domestic banks nostro balances to not more that hundred percent of their net-worth as per the prudential requirement of the Banking Supervision Department of the Bank of Ghana, may appear helpful in a predominantly cash economy. However in recent times when such emerging economies are being exposed to complex financial transaction such as derivative instruments, the domestic financial institutions would be highly dependent on the operations of their foreign counterparts. These balances may not appear in the nostro balances for which the danger could be halted or curbed by restrictions on the nostros. For instance with the discovery of oil on the shores of Ghana, most financial institutions in Ghana especially the foreign based ones will now be part of the conduit of oil financing in the country. The chunk of these transactions would not be straight forward financial transaction but may involve complex financial engineering of sophisticated products. The products may defy regulation since they may not even appear on-balance sheet items. It is apparent from the study that unless emerging countries put in place appropriate structures to decouple themselves from the developed economies, if they are fortunate not to be brought down by the next recession, they might not survive the aftershocks of the any financial crisis.

- In October 2008 a lot of countries announced comprehensive rescue and stimulus packages to support systemically important banks but did not completely restore confidence into the system. The main objective of the rescue packages was to build investor confidence in the system. Though to a large extent the rescue packages protected depositors and managed to restore some sanity by calming the nerves of depositors down, it did not completely succeed in restoring market confidence in the banking sector as access to private sector capital remained restricted throughout 2008 and there was little or no interbank borrowing in the

countries' most hit by the global financial crisis. Instead banks remained dependent on government guaranteed debt issuance and capital injections, whilst others were completely taken over by government. (Michael R King, 2008). This means rescue packages in themselves do not restore sanity unless there is confidence in the system. Confidence in financial world is built strongly when no bank or financial institution is suspecting that the other is in danger because it has requested for financial assistance from the central government. Northern Rock Bank's demise was greatly facilitated by the delay in extending financial support to them by the Bank of England. Even when seeming sanity has been restored, banks and financial institutions are still more comfortable with government guaranteed transaction thus slowing down the expected growth in such economies. It is for this reason that the study concludes that it is better to build shock absorbers into banks and non bank financial institutions especially systemic important institutions to cushion them and the whole economy against the ravages of systemic risks.

- The recent global financial crisis has caused a serious rethink of regulatory requirements and policies. It has made people not only to consider what systemic risk means, but also about what it means for policy. "Systemic risk was found to have been underestimated across board before the global financial crisis. We were faced with the unthinkable when a number of very large institutions failed, despite their previous reputation for balance sheet strength and leadership in risk management. Coming to grips with systemic risk is therefore vital because the aggregate risk facing the system is much higher than the simple sum of the individual risks attending financial institutions, products and markets". (Jaime Caruana, General Manager of the BIS, 12 February 2010). As already noted, the developed world together with Basel Committee of Banking Supervisors (BCBS), though conscious of the potential danger of systemic risk, did very little to curb it. The derivative market was left uncontrolled and cross-border activities were encouraged with little attention. Regulation therefore did not keep pace with the activities of the global economy. Banks and other financial institutions should be

encouraged to pay attention to systemic risk and make permanent allocation to it at the institution or micro level. Indeed, whatever measures is considered at the macro level it would be very effective when it is combined permanent allocation of a charge for systemic based on the capital adequacy framework at the micro level.

- Another problem which was found to have bedevilled markets and the economies of most countries including emerging countries is the issue of pro-cyclicality and how to take counter-cyclical measures to address the problem. Financial institutions are believed to respond positively to economic cycles. Banks and other financial institutions would naturally grant more credits and generally increase their operational activities when there is economic boom and do the opposite when there is a slum. This means that the activities of financial institutions have a strong relationship with booms and slumps. To put it bluntly, banks and non bank financial institutions support booms and worsen slumps probably through inertia. In view of this, policy makers, both fiscal and monetary, would be expected to inject funds into the system in periods of crisis to stir the activities help and revive the economies of these countries. The financial institutions naturally react to the system especially when they have a weak balance sheet. It is for this reason that the additional charge to ensure counter cyclicality cannot be gainsaid. A permanent charge for systemic risk through the capital adequacy ratio (CAR) framework is very crucial to a system which is becoming more and more complex. Permanent capital in the books of banks is the base upon which every risk framework resolves. The framework should be strengthened in the face of the growing complexities of the financial system of the world and to ensure its safety and soundness.

- The recent global financial crisis has proven that it is much more expensive to do nothing or do little to curb disasters than to arrest the situation when the problem has not occurred. The crisis revealed that strong institutions and strong markets, at least, had the tendency of withstanding the crisis to a point. A well capitalised bank would withstand shocks much more than institutions which lack capital.

Billions of United States dollars, British pound, Euro etc were pump into institutions to reverse the recessions that affected the developed economies. The rescue packages which most of the developed countries affected by the crisis put in place were meant to ameliorate the situation by not only salvaging institutions, but to a greater extent, restore jobs and other social activities. It was therefore much more expensive and probably unfair to salvage banks and other financial institution by using the tax payers' funds. As revealed from the study, it is more appropriate for banks and non bank financial institutions to create their own funds to either salvages themselves from any financial quagmire or prevent the situation from occurring in the first place. It is for this reason banks would not hesitate to create to additional fund in the form of hidden reserves to strengthen themselves against the ravages of a system wide risk.

- The foregoing review underpins the need for an effective and sustainable mechanism to be established to curb systemic risk rather than resorting to ad-hoc rescue packages on solo basis or country specific basis. It is even more crucial for emerging countries which may not have the luxury of having to raise huge one off funds to rescue their financial institutions, to build their strength gradually over time.

- Stress testing which hitherto was almost non-existent in the vocabulary of most emerging countries including Ghana was gradually being imbibed into the banking system. The banks in Ghana were now being encouraged to include stress testing in their routine risk management practices by the central Bank of Ghana. The results of a less complex stress test conducted by the Monetary Policy Committee of Ghana in July 2009 which largely supported the findings of the study showed that banks in Ghana collectively were found to be solvent but a disaggregation revealed individual technical insolvencies of at least two the banks with the Medium Group Banks (MGB) and Small Group Banks (SGB) respectively. The test was a simple what if analysis. The first step involved analysing the effect on the industry should all loans in the OLEM category suddenly move into the substandard category. The second involved analysing the effect of moving all substandard loans to the doubtful

category and analysing the effect on the industry; and finally analysing the results if all loans in the doubtful category suddenly become bad. The results of other forms of testing involving losing a single largest customer also revealed intriguing results with Ghana Commercial Bank becoming the worst affected should one single largest customer go burst. The stress testing was generally based on a modified assumption that un-retained profits were available to absorb profits. The study is of the view that much as stress testing is brings out the weaknesses in the system it does not provide an antidote. It only useful a precursor or a diagnostic tool to financial weaknesses; it does not help in curbing systemic risk.

- The study revealed that capital regulation is very effective and reliable in ensuring solvency of the financial system. It has been argued that Pillar 2 which is mainly a Supervisory Review Process of the Basel document, involving regulation of the financial institutions prescribe, among others, the concept of "Internal Capital Adequacy Assessment Process" (ICAAP). ICAAP means that banks are encouraged to institute their own internal processes for determining their economic capital or capital which is adequate for their operations. The fundamental objectives of ICAAP are as follows: identifying and measuring material risks; setting and assessing internal capital adequacy goals that relate directly to risk; and finally, ensuring the integrity of internal capital adequacy assessments.

- Economic capital has been considered to be very important but must at all times be equal to or exceed regulatory minimum requirements, regardless of ICAAP results. (Sandra L Thompson, 2008)[25]. The view of Sandra Thompson is shared by many including Persaud & Spratt 2004, Kyshap & Stein 2004 and Viral Archaya 2000 who have gone further to assert that the Pillar 1 of the Basel framework should be made to incorporate systemic risk. The ICAAP though forward-looking and future oriented (Huang, Zhou & Zhu, 2009) are limited to the institutions' risk appetite. Since ICAAP is internal and is largely subjective, it may not be as effective as a mandatory capital requirement under Pillar 1. Also it still does not consider the interactions of

[25] Memo of Sandra L Thompson, Director Division of Supervision and Consumer Protection titled "Final Guidance: Supervisory review process of Capital Adequacy (Pillar 2) Related to the implementation of the Basel II Advance Capital Framework.

the risk factors which together constitute systemic risk. Again, being internally motivated and controlled, the ICAAP could be subjected to abuse by the institutions management. Again, leaving institutions to establish the materiality of the risk associated to their operations may lead to the understatement of risks. The study believes that ICAAP is a good concept but systemic risk should not only be charged but be made mandatory in the financial world.

- The study did not seek to condemn the Basel Accords of Basel I & II as well as the works of renowned researchers like Persaud & Spratt, 2001 but rather sought to augment their work. The study associates itself with the reactions of Persaud & Spratt, 2005 on the following:

- Systemic risk should be captured through the capital adequacy ratio (CAR) framework under Pillar 1.
- Systemic risk charge of banks should be based on their systemic importance.

- The study however disagreed with Persaud & Spratt, 2001 on the mode of their computation of the systemic risk. The study established that systemic risk must be scientifically computed. It must therefore reflect the operations of the bank based on their systemic importance.

- It is clear from the study that systemic risk is very crucial and must be captured in the capital adequacy ratio (CAR) framework. The CAR framework is by far the celebrated risk measurement framework in the banking and financial industry. Again from the results of the study it is clear that systemic risk could be identified and evaluated based on the interaction of the traditional risk factors of credit, market and operational risk. Also knowing that system risk is more devastating than any of the risk factors, it (systemic risk) was found to grow at a faster rate than any singular risk factor.

- In conclusion it could be said that though the study largely agreed with the works of Persaud & Spratt it sought to improve on the measurement of systemic risk charge through a more scientific means.

- Again the finding of the study that foreign banks which are systemic important pose greater systemic risk to the system than their domestic counter parts should be an issue of concern to emerging countries. Despite the political interferences which most often kills domestic banks slowly, foreign own banks of emerging countries which have fallen out of strategy for one reason or the other could be pulled out by their parents without the slightest compunction since they usually form just a fraction of the whole group. Can one imagine the effect of allowing Barclays Bank Ghana Limited or Standard chartered Bank Ghana Limited to collapse on the Ghanaian economy or the economies of other emerging countries? It is for this reason that the introduction of a buffer by way of systemic risk in the capital adequacy ratio framework is even more crucial to the emerging countries. The introduction of a Deposit Insurance scheme which, is outside the scope of this study could also be considered by Ghana and other emerging countries. This could be used in addition to the capital adequacy framework which would be modified to include systemic risk.

5.4 RECOMMENDATIONS

The study recommends the following:

- Systemic risk should be established or identified through the sets theorem to obtain a core risk due to the interaction of the risk factors; and as a result of 'negative synergy' that the interaction produces, the core risk produced is expected to grow exponentially; in this case a growth rate which is double the dominant risk factor must be applied. This is shown below.

- $$\cup_i^n A_i = \sum_{i=1}^{n} A_i - \sum_{i=1;k=2}^{n-1} A_i \cap A_k + \cap_{i=1}^{n} A_i$$
- The above model shows that if we have an infinite number of risk elements depicted by (n), the union of those risks elements is a summation of all the risks less the summation of the intersection of the paired risk elements plus the intersection of all the risk elements.

- Having obtained (S^1);

- We then use the theory of synergy i.e. "2+2 = 5" to derive systemic risk (S) indicating that (S^1) will grow exponentially due to the synergy that the risk factors produce. Synergy in this sense is the increase in risk due to their interaction and escalation of the factors within the systemic risk cycle.

- That having identified and obtain a fair estimate of systemic risk, banks should measure and control the risk through the capital adequacy ratio (CAR) framework in addition to the other risk factors. A capital charge must be made for systemic risk in the CAR framework. Capital adequacy ratio (CAR) framework has generally been found to be an instrument which reduces moral hazard of bank owners arising from difficulties depositors face controlling the investment policies of banks (Freixas and Rochet, 1997). Capital adequacy ratio (CAR) is primarily instituted to ensure that risks associated with depositors' funds are mitigated. "When a financial institution is forced to have a large amount of equity capital, it has more to lose if it fails and is thus less likely to engage in risky activities. In addition, equity capital in itself reduces the probability of failure because it provides a cushion to withstand adverse effects on the institutions balance sheet." (Mishkin, 1999). In this regard systemic risk charge fused into the capital adequacy framework will help curb the ravages of systemic risk.

- The global financial crisis has caused a serious rethink of regulatory requirements and policies. New strategies are being devised by various people, institutions, authorities and markets to effectively manage the risk in the financial system. It has made people not only to consider what systemic risk means, but also known about what it means for policy. Systemic risk is found to have been universally underestimated before the global financial crisis. We were faced with the unthinkable when a number of very large institutions failed, despite their previous reputation for balance sheet strength and leadership in risk management. An understanding of systemic risk is therefore vital because the aggregate risk facing the system is much higher than the simple sum of the individual risks associated with financial institutions, products and markets. Policy makers would now have to put in place measures to either forestall the risk from occurring or take steps to accommodate risk, that is, to prevent it from spreading. Countries which have developed blueprints in the form of national contingency plans for the financial industry could better withstand the ravages of systemic risk than a country which has nothing.

- Banks with foreign parentage were found to have better risk management practices than their domestic counterparts because the parent banks who are found to have established very good risk management and control functions easily pass them on to their subsidiaries in the group. It is therefore imperative that the domestic banks should be made to institute risk management control functions with the help of the Bank of Ghana by fostering knowledge sharing mechanisms among the banks. This could be made possible by organising joint and collective workshops with the aid of experts in the industry. Risks control and curtailment could not be part of trade secrets of banks and financial institutions. It would be naive and parochial or better still absurd for any one financial institution to think by sharing better risk management practices with the industry would be tantamount to giving out trade secrets.

Risks especially the systemic ones do not need keys to open the doors of banks neither do they need to be welcome by financial institutions, this is because they are easily transferable. The collapse of Ghana Commercial Bank (GCB) can bring the whole banking system in Ghana to a halt, so why would bank Barclays Bank Ghana or Standard Chartered Bank Ghana be reluctant or refuse to share its risk management practices with GCB. Once a common platform is created all banks will share what they have and practice. It is therefore the view of this study that either the Ghana Bankers Association or the Bank of Ghana should facilitate this forum of risk sharing knowledge among the financial institutions.

- The results of frequency table 4.15 show that the non-deposit taking financial institutions develop products similar to their counterparts in the banks and other financial institutions. The study therefore recommends that based on the findings, the capital adequacy framework and other risk management practices practised by the deposit money banks (DMBs) should be extended to the non bank financial institutions since the risks associated with their operation are similar. Also leverage a ratio (total liability over equity) which measures the number of times an institution owes against its equity or the risk absorption capacity of the institution was hitherto statutorily applied to the non deposit-taking non bank financial institutions (NBFIs) should be extended to the deposit money banks (DMBs) and other deposit-taking non bank financial institutions. This is because the Capital Adequacy Ratio (CAR) only concentrates on the asset side of the balance sheet. The liability side of the balance sheet of these institutions are not adequately catered for in the solvency requirements of deposit money banks (DMBs) and deposit taking non bank financial institutions (NBFIs).

- Operational risk was found to be negligible due to the poor capturing mechanism. Operational risk was based on net income of audited financial statements hence start-up banks and loss making banks were not charged for

operational risk. The study therefore recommends that operational risk should be based on institutions gross income and not net income as recommended by Basel II. Also the monthly charge for first year operations should be based on the institutions management accounts and not the audited accounts since, audited financial statements would not be available until after the first year of operations.

- That in case of any eventuality banks must be rescued devoid of pre-conditions to their rescue since such conditions would not hold until the financial system is sane. The priority of any central bank would be to sanitize the system. All other things including moral hazards will be secondary to safety and soundness. Any Conditionality attached to the attached to the rescue package should assume a post position since it can only be effective after the system has been sanitised. A clear cut rescue package policy must be established in addition to the Capital adequacy framework. The study recommends the view of Viral .V. Acharya 2000, which outlined two important mechanisms that central banks should use to curb systemic risk, namely, a capital adequacy to prevent crisis ex-ante and a rescue policy to manage the crisis ex-post. The literature was of the view that in addition to other risk management practices such as ceilings on deposits, restrictions on branching and scope of banking activities, regulation of the nature of competition amongst banks and between banks and other financial institutions etc, was crucial, so as to ensure the safety and soundness of the financial sector. The literature again supported the view that financial regulation should ensure financial stability of the system as whole and not individual institutions. The study therefore strongly recommends that governments, especially, from emerging countries including Ghana should as soon as possible put in place a clear-cut rescue policy in the form of contingency plans in addition to the capital adequacy framework.

- That systemic risk calculation should be based on individual banks to reflect their systemic importance and should not be based on the general appropriation of risk of the system as advocated by Viral A. Achaya, 2007. Systemic risk computation based on general appropriation would not have the desired effect of ensuring that banks prepare and manage their risks. Besides, it would inappropriately allocate risks on the assumption that all banks are equal in size, operations etc.

- Banks do not need external credit rating agencies to rate their earning assets. The study associates itself with Persaud and Spratt 2001, which advocates that banks should be allowed to rate their customers based on their internal data and information from the credit reference bureaux. However, in addition the study recommends that this should be based on a general framework to be developed by the industry and must be championed by the Central Bank or the Bankers Association. This way the banks would be able to easily migrate from 'Standardized Approach' to 'Internal Rating Based Approach' by developing the needed skills and expertise. Using external rating agencies will stifle the banks' initiative. It is however the view of the study that ratings of the rating agencies should be used in a collaborative manner especially when their rating is higher than that generated by the institutions mechanism.

- The study recommends that banks would be charged for systemic risk based on their size and complexities. This assertion was supported by the results of frequency table 4.24 and corroborated by the analysis of the chi squared test as per table 4.39 which gave a positive net residual of 16.6 of the observed values over expected values. It is also a view held by Persaud and Spratt, 2001.

- The study strongly supports the assertion that the derivative market including securitisation should be highly regulated irrespective of whether they are used for hedging or for speculative purposes. This was corroborated by the results

of the chi squared test of table 4.42 which showed a positive residual of 5.7 and 15.7 for Strongly Agree and Agree respectively. This means the respondents were very positive that derivative markets must be regulated. The international financial crisis has caused a serious rethink of regulatory requirements and policies. New strategies are being devised by various people, institutions, authorities and markets to effectively manage the risk in the financial system. It has made people not only to consider what systemic risk means and the ravages of it, but also about what it means for policy. Systemic risk was found to have been underestimated across board before the global financial crisis. (Jaime Caruana, 2009). Hitherto systemic risk had been considered as any other risk and even much less a risk because no charge was allocated to it. For this reason, products and activities which of systemic nature were completely ignored. One of the reasons why the global financial crisis swept like 'wild fire' was the unregulated derivative market. The derivative markets once started thrives on transactions with little or no underlying. Now that derivatives are invading the markets of emerging countries, including Ghana, it is imperative that the authorities ensured that the market is effectively regulated. This could start with the central bank should redesigning its prudential returns to capture all sophisticated products, processes and activities to enable it make the appropriate charge. Opportunities should be given to the financial institutions to adequately disclose all forms of financial derivative in their prudential returns. Also authorities should ensure transparency and market discipline in the market. The Stock Exchanges in the emerging countries must be encouraged to trade in equity related derivative. Over-the counter markets must be properly established to facilitate the registration of derivative products. These could be done through recognition and empowerment of trade groupings and associations to establish effective self-regulatory mechanisms. This way, transactions on such markets could be recorded and universally regulated by an umbrella body through the satellite groupings. It would also be easier to collaborate with other regulatory authorities of the financial system like the

Bank of Ghana, the Insurance commission, and the Securities and Exchange Commission to effectively regulate the financial system since products of all these authorities are traded on the derivative.

- From the preceding paragraph, it is imperative that 'Problem Bank Resolution Policies' are put in place to curtail the collapse of a bank or a non bank financial institution which is in distress. The Banking Act of Ghana, 2004 (Act, 673) makes some provision for problem bank resolution including granting of credits to solve liquidity problems and appointing a conservator to handle the management problems of the bank. The study however recommends that in addition to the provisions of the Act, a comprehensive contingency plan for the industry as a whole must be put in place. The plan should indicate the nature and form that a rescue package vis-à-vis the prevailing problem of the bank or non bank financial institution should be. For instance where a bank's or a non bank financial institutions problem is more of solvency and possibly mild liquidity problems due to 'toxic assets' on the institution's balance sheet, then issue of bonds to clean the balance sheet may be appropriate. However, where the issue is due to chronic liquidity problem then the rescue package should be a direct injection of funds. The contingency plan could indicate which banks could be salvage and which once should be allowed to go aground in case of any financial difficulty. Without a contingency document with a clear cut rescue policy for the financial system, the wrong action or inaction of the Bank of Ghana could aggravate a financial turmoil.

- It was revealed that most of the foreign banks claim it is convenient for them to hold cash in excess of their required nostro balances with their parent banks in violation of the prudential requirement that no bank shall in aggregate hold nostro balances over and above one hundred percent of their networth. This prudential requirement was meant to partially decouple the foreign banks from their parent banks so as to curb systemic risk. Foreign banks are largely profit

oriented and therefore have the tendency of folding up once the foreign outlet is out of tune with their strategy, despite the size of the outlet in the given country and the effect of the closure to the local country. The central banks of the emerging countries including the Bank of Ghana should ensure that all requirements which border on risks and are particularly injurious to the solvency of the banks which could plunge the financial system of the whole economy into jeopardy are backed with statute. All banks, especially, the foreign large group banks should be strictly required to comply with the statute and heavy sanctions must be applied so that no one bank would consider holding the system to ransom by violating prudential requirements that border on systemic risk in lieu of the bank's convenience. The financial system of a country is more important than the convenience of any bank. Also formal arrangements must be made with parents of foreign banks to ensure that in case of any form of cessation in the domestic country all financial obligations must be born either by the domestic firm or the parent before it would be allowed to wind up.

- Banks should give as much information to the public to avoid information asymmetry. Systemic risk is mostly fuelled by perception and perception thrives when the full facts are not fully known to the public. Adequate information is therefore vital for the public to express confidence in any institution or system. Mishkin, 1999 noted that "…a crucial impediment to the efficient functioning of the financial system is asymmetric information". He again noted that asymmetric information leads to two basic problems in the financial system: adverse selection and moral hazard. Where this happens on a mass scale, the health of the financial system will permanently be damaged in the eyes of the public and the ensuing perception that might ignite would be more damaging than 'fire ravaging a forest in a dry weather'. The banks and the financial institutions should be encouraged by the central banks to give adequate information about their solvency and liquidity positions. This way, the public would be assured of transparency in the financial system. This

would go well to reduce the activities of the underground world. Banks should again be encouraged to have well designed communication policies to package information adequately and in the right form to the public.

5.5 LIMITATION OF THE STUDY

The study concentrated on data from the banking industry in Ghana because it was very difficult to obtained data for the purpose of the study from other countries. Also for the purpose of obtaining information for secondary data analysis the study concentrated on twenty five out of twenty six (26) banks for a period of five (5) years from 2005 to 2009. This is because the last (twenty-sixth) bank had just been issued licence and had been operating for less than six months at the time of collecting data for the study. Also the study considered five years as statistically long enough to be representative for the purpose of the analysis. Again about half of the banks had not existed for more than five years and for that reason secondary data collected beyond five years might distort the analysis. However, for the purpose of analysis of the primary data, the study concentrated on professionals and risk managers from fifteen (15) banks and five non-bank financial institutions because it would have been difficult and more costly to send questionnaires to all the players of the industry.

Again, for the purpose of the study, non-bank financial institutions were restricted to institutions under the supervision of the Bank of Ghana. This includes the savings and loans companies, the finance houses, the mortgage companies, the leasing companies and the remittance companies. Institutions such as the securities & brokerage firms as well as the insurance companies which are under the supervision of the Securities and Exchange Commission and the Insurance Commission respectively are excluded from the study. Other non-bank financial

institutions such as the co-operative unions, susu firms and the money lenders are also excluded from the study.

The study also restricted the literature review to data which is relevant to the study and recent enough to be more meaningful for the purpose of the study.

Again for the purpose of the research systemic review has been restricted to the risk of the financial world. Systemic risk in a very general sense is not a phenomenon limited to economics or the financial system. The most natural illustration of the concept might be in the area of health and epidemic diseases[26]. HIV AIDS, Malaria, H1N1 (Swine flu) infections, are but a few health related systemic risks that the world has witnessed over the years. Systemic risk could even be extended to dangers and atrocities of terrorists' activities which have been rampant and widespread in recent years. The fact that everybody seems to be at risk, including the perpetuators of such heinous criminal activities themselves qualifies such acts and the risk associated thereto as systemic.

The computation of the 'Augmented't'' tests was limited to the large, medium and small groupings for the purpose of the study though this did not necessarily reveal the insolvencies of the individual banks.

[26] These are severe cases (e.g. the Great Plague in the Middle Ages) of widespread contamination which may wipe out a significant portion of the population.

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7.0 APPENDICES

7.1 INTRODUCTION TO QUESTIONNAIRE

JOSEPH FRANCE
BANK OF GHANA
BANKING SUPERVISION DEPARTMENT
P.O.BOX 2674, ACCRA
Cell 0277453414
September 22, 2009

Dear Sir,

ACADEMIC QUESTIONNAIRE:- SYSTEMIC RISK AND CAPITAL CHARGE FOR BANKS AND NON BANK FINANCIAL INSTITUTIONS IN GHANA

In fulfilment of a PhD degree programme in Finance from the St. Clements University, Turks and Caicos Island, British West Indies, I am researching into systemic risk of the financial system and whether a specific charge should be made for it by financial institutions. Systemic risk in this context is viewed as the risk that affects the whole financial system and not restricted to individual institutions.

Please, I will be grateful if you could take a little time off your busy schedule to go through the set of questions attached.
Thanks

Yours faithfully

7.2 QUESTIONNAIRE

QUESTIONAIRE

SCHOOL: **SAINT CLEMENTS UNIVERSITY, TURKS AND CAICOS ISLAND, BRITISH WEST INDIES**

PROGRAMME: **PhD FINANCE**

TOPIC: **SYSTEMIC RISK AND CAPITAL CHARGE FOR RISKS OF FINANCIAL INSTITUTIONS IN GHANA**

PLEASE TICK WHERE APPROPRIATE

1. Indicate the type of your institution
    a. Banking
    b. Deposit taking Non Bank Financial Institution
    c. Non Deposit taking Non Bank Financial Institution
2. What form does your institution take?
    a. Foreign subsidiary
    b. Local firm
3. What is your position or role
    a. Chief Executive Officer/ Managing Director
    b. Risk Manager
    c. Compliance office
    d. Chief Finance Officer/Financial Controller

e. Others (indicate)

4. How long have you been at this position indicated in Q.3 above?
    a. Below one year
    b. One year to three years
    c. Over three years
5. Where will you place your institution in the industry in terms of market share by asset size?
    a. 1-3
    b. 4-10
    c. 11-15
    d. Over 15

6. Do you have a risk management department/unit
    a. Yes
    b. No
7. If "No" why
    a. Not relevant
    b. Relevant, but no expertise
    c. Relevant, work in progress
8. If "yes" how effective is the department
    a. Very effective
    b. Barely effective
    c. Not effective

9. Systemic risk has become a very topical issue in the financial industry in recent years.

Strongly agree	Agree	Neutral	Disagree

10. Separate identification, measurement and control of systemic risk amongst financial institutions are crucial.

Strongly agree	Agree	Neutral	Disagree

11. A separate charge should be made for systemic risk by the capital adequacy framework.

Strongly agree	Agree	Neutral	Disagree

12. Financial institutions should include capital charge of systemic risk based on their systemic importance to the financial system.

Strongly agree	Agree	Neutral	Disagree

13. Most non-deposit taking financial institutions develop products similar to their counterparts in the deposit taking category.

Strongly agree	Agree	Neutral	Disagree

14. Capital charge (CAR) for risks should be extended to other non-bank financial institutions, whether deposit taking or non deposit taking.

Strongly agree	Agree	Neutral	Disagree

15. Credit, operational and market risk factors are interrelated?

Strongly agree	Agree	Neutral	Disagree

16. Complexity and sophistication of financial institution reflect in the current computation of capital charge.

Strongly agree	Agree	Neutral	Disagree

17. Banks should be allowed to fail irrespective of the extent of risks they pose to the system if they take bad decisions.

Strongly agree	Agree	Neutral	Disagree

18. Banks and other financial institutions should be rescued with the tax payers' money to prevent them from failing.

Strongly agree	Agree	Neutral	Disagree

19. Financial institutions should create a fund to rescue themselves in case of any eventuality.

Strongly agree	Agree	Neutral	Disagree

20. Capital charge for systemic risk could prevent banks and other financial institutions from becoming systemically important.

Strongly agree	Agree	Neutral	Disagree

21. Capital charge for systemic risk could prevent financial institutions from failing.

Strongly agree	Agree	Neutral	Disagree

22. Systemic charge should be a fixed or general charge to financial institutions irrespective of their size and complexity.

Strongly agree	Agree	Neutral	Disagree

23. Systemic charge should be a specific charge to individual financial institutions to reflect their size and complexity of operations.

Strongly agree	Agree	Neutral	Disagree

24. Determination and incorporation of capital charge for systemic risk would make the capital adequacy prescription of Basel II more conservative.

Strongly agree	Agree	Neutral	Disagree

25. The CAR (Capital Adequacy Ratio) framework should directly incorporate the measurement of such an important risk as systemic risk.

Strongly agree	Agree	Neutral	Disagree

26. The derivative market in Ghana should be highly regulated irrespective of whether it is used for hedging or for speculative purposes.

Strongly agree	Agree	Neutral	Disagree

7.3 REQUEST OF INFORMATION FROM BSD BANK OF GHANA

JOSEPH FRANCE
BANKING SUPERVISION DEPARTMENT
BANK OF GHANA

March 12, 2010

The Head
Secretary's Department
Bank of Ghana
Accra

Dear Sir,

REQUEST FOR INFORMATION

In connection with an on-line PhD programme that I am undertaking with St. Clements University Turks and Caicos Island British West indies, on the topic "Capital Adequacy Ratio (CAR) and Systemic risk of the Banking and Non Banking system in Ghana", I wish to respectfully request for the following information from the Bank of Ghana.

Prudential returns on the Banks CAR (BSD 5) from 2005 to 2009.
Prudential returns on Non Performing Loans (NPL) (BSD 8) from 2005 to 2009.
Prudential returns on the banks balance sheet from 2005 to 2010.

Hoping my request will be granted I thank you in advance.

Yours Faithfully

Joseph France

7.4 NOTIFICATION OF EMPLOYERS

NOTIFICATION OF EMPLOYERS (BANK OF GHANA) OF UNDERTAKING THE PROGRAMME

JOSEPH FRANCE
BANKING SUPERVISION DEPARTMENT
BANK OF GHANA

April 09, 2010

The Head
Human Resources Department
Bank of Ghana
Accra

Dear Sir,

PhD DEGREE- ST. CLEMENTS UNIVERSITY TURKS AND CAICOS ISLAND BRITISH WESTINDIES

In line with the policy of Bank of Ghana on private education, I wish to inform you that I am undertaking an On-line PhD degree programme at the above university on the topic "Capital Adequacy Ratio (CAR) and Systemic risk of the Banking and Non Banking system in Ghana". I wish to state that I use my private resources and private time for the programme.

Yours Faithfully

Joseph France

7.5 CONSENT BY EMPLOYERS TO PROGRAMME

BANK OF GHANA

TELEPHONE: 666902 - 8
666174 - 6

P.O. BOX 2674
ACCRA
GHANA

BSD FAX NO. **662038**

OUR REF: BSD/24/2008 **DATE:** 16th April, 2010
YOUR REF:

Joseph France
Banking Supervision Department
Cedi House,
Accra.

Dear Sir,

RE: PhD DEGREE- ST. CLEMENTS UNIVERSITY TURKS AND CAICOS ISLAND BRITISH WESTINDIES

We acknowledge receipt of your letter dated April 9, 2010 informing the Bank of your pursuance of an On-line PhD degree programme at the above university on the topic "Capital Adequacy Ratio (CAR) and Systemic Risk of the Banking and Non Banking System in Ghana".

While we congratulate you on your effort, please take note that the programme is at your initiative, and you will therefore be required to make all the necessary arrangements to meet its demands.

You are also reminded that it is an offence to use the Bank's working hours (8.00am to 5.00pm) to pursue the programme.

Yours sincerely,

Josephine Ami-Narh (Mrs)
FOR: HEAD
HUMAN RESORCES DEPARTMENT
Cc: PM