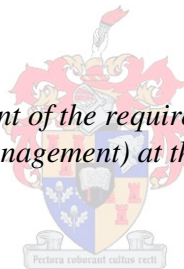


A Modelling Process of Short-term Interest Rate Risk Management for the South African Commercial Banking Sector

by

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of Commerce (Business Management) at the University of Stellenbosch*



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DECLARATION

By submitting this thesis electronically, I declare that the entirety of the work contained therein is my own, original work, that I am the authorship owner thereof (unless to the extent explicitly otherwise stated) and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

Date: December 2010

ABSTRACT

This study focuses on banking book interest rate risk management, more specifically short-term interest rate risk management problems. This type of risk is induced by the inflation targeting policy of the South African Reserve Bank. As a result, inflation leads to an uncertain interest rate cycle and a period of uncertain interest rate levels as it relates to lending and borrowing products in the South African commercial banking sector.

The lending rates of most South African commercial banks are tied to the prime overdraft rate. The borrowing rates are linked to the money market rates such as the Johannesburg Interbank Agreed Rate (JIBAR) which is indirectly affected by the prime overdraft rate. Hence, lending and borrowing rates are related to the repo-rate. Furthermore, a fixed relationship exists between the prime overdraft rate and the repo-rate. The monetary policy committee meets every two months during the year to make inflation and repo-rate adjustments, as stipulated in the inflation targeting policy. A subject portfolio containing fixed-rate loans, advances and floating-rate deposits is exposed to the change of the repo-rate. This short-term banking book interest rate risk is defined based on the fact that the repo-rate adjustment occurs every two months, the banking book risk management is short term focused, and hedging instruments against interest rate risk are short term dated contracts. Such a short term risk may have a negative impact on the bank's profitability.

The study starts with a review of the bank risk management processes, and then discusses the enterprise risk management framework that guides the formation of the risk management processes and systems. In order to benchmark against international risk management practices, a comparative analysis is carried out to evaluate the risk management tendencies of bank risk management in South Africa and globally.

The empirical findings reveal that most banks (i.e. eighty per cent of all local banks) manage the short-term interest rate risk by following the same process as the interest rate risk in general. The key elements (risk identification, measurement, mitigation and monitoring and reporting) of the banking book interest rate risk management are not linked together as a systematic process. This is not in line with the Basel II Accord to manage market risks through a process approach.

The study also proposes a generic short-term interest rate risk management framework and in

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doing so, addresses some of the weaknesses of current risk management practices. Based on this framework, the South African banks may develop their own processes to manage such short-term banking book interest rate risk exposure.

Some of the problems of bank risk management that come to light from the empirical findings, are summarised in the last chapter and may be considered for future research.

OPSOMMING

Hierdie studie fokus op die probleme van die bankboek rentekoersrisikobestuur, meer spesifiek die korttermyn rentekoers risikobestuursprobleme. Hierdie tipe risiko word deur die inflasieteikenraamwerk beleid van die Suid-Afrikaanse Reserwebank veroorsaak. Dit veroorsaak 'n tydperk van onsekere rentekoersvlakke veral sover dit uitleen- en leenprodukte in die Suid-Afrikaanse kommersiële banksektor aangaan.

Die uitleenkoerse van die meeste Suid-Afrikaanse kommersiële banke is aan die prima bankoortrekkingskoers gekoppel. Die leningstariewe is aan die geldmarkkoerse soos die Johannesburgse Interbank Ooreengekome Koers (JIBOK) gekoppel wat indirek geraak word deur die prima bankoortrekkingskoers. Uitleen- en leenkoerse is redelik afhanklik van die repo-koers waar laasgenoemde 'n redelike vaste verwantskap met die prima bankoortrekkingskoers het. Die monetêre beleidkomitee vergader elke twee maande van die jaar om inflasie en repokoers aanpassings te maak, ooreenkomstig die inflasieteiken beleid. 'n Bepaalde portefeulje met vasterente lenings, voorskotte en vlottende koers deposito's is blootgestel aan die verandering in die repokoers. Hierdie korttermyn rentekoersrisiko van die bankboek word gedefinieer op grond van die feit dat die repo-koers aanpassing elke twee maande gebeur. Die bankboek risikobestuur het 'n korttermyn fokus, en verskansingsinstrumente teen rentekoersrisiko is korttermyn kontrakte. So 'n korttermyn risiko kan 'n negatiewe impak op die bank se winsgewendheid hê.

In hierdie studie word bankrisikobestuur prosesse beskou. Die risikobestuursraamwerk wat die basis vorm van die risikobestuursprosesse en stelsels word aangespreek. Om 'n idee te vorm van die huidige internasionale risikobestuurspraktyke of tendense by banke, word die state van internasionale en oorsese banke kortliks beskou.

Die empiriese bevindinge uit die opname dui daarop dat die meeste banke (d.w.s tagtig persent van alle plaaslike banke) die korttermyn rentekoersrisiko nie afsonderlik van rentekoersrisikobestuur in die algemeen bestuur nie. Die sleutelemente van die risikobestuursproses (risiko identifisering, mitigasie, implementering, monitering en verslagdoening) kom wel voor maar die bankboek rentekoersrisikobestuur is nie gekoppel as 'n sistemastiese proses nie. Dit blyk dat hierdie situasie na alle waarskynlikheid nie in lyn is met die Basel II akkoord om markrisiko's deur 'n prosesbenadering, te bestuur nie.

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Die studie stel ook 'n generiese raamwerk voor vir die bestuur van korttermyn rentekoersrisiko wat dan ook van die swakhede van die huidige risikobestuurspraktyke aanspreek. Op grond van hierdie raamwerk, kan die Suid-Afrikaanse banke dit oorweeg om hul eie prosesse te ontwikkel vir die bestuur van bankboek rentekoersrisiko blootstelling.

Sommige navorsingsprobleme van bank risikobestuur wat uit die empiriese bevindinge aan die lig gekom het, word in die laaste hoofstuk opgesom en kan vir verdere navorsing in die toekoms oorweeg word.

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LIST OF ACRONYMS

ABSA	Amalgamated Banks of South Africa
ALCO	Asset Liability Committee
ALM	Asset-Liability Management
BACC	Bank Audit and Compliance Committee
BCC	Bank Credit Committee
BER	Bureau of Economic Research
BMRM	Bank Market Risk Monitoring
BP	Basis Point
BRC	Bank Risk Committee
BRCM	Bank Risk and Capital Management
BRMC	Bank Risk Management Committee
BROC	Bank Risk Overseeing Committee
CD	Certificate of Deposit
CFaR	Cash Flow at Risk
CEO	Chief Executive Officer
CFO	Chief Financial Officer
CPC	Credit Policy Committee
CPIX	Consumer Price Index excluding mortgage rate changes
CPI	Consumer Price Index
DDA	Demand Deposit Account
DFA	Dynamic Financial Analysis
DST	Dynamic Solvency Testing
DVaR	Delta VaR
EaR	Earnings at Risk
e.g.	For Example
ERM	Enterprise-wide Risk Management
ERMF	Enterprise Risk Management Framework
ETL	Expected Tail Loss
EVaR	Extreme Value at Risk
eVaR	Economic Value at Risk
EVE	Economic Value of Equity

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EVT	Extreme Value Theory
EXCO	Executive Committee
FDIC	Federal Deposit Insurance Corporation
FRA's	Forward Rate Agreements
FRN	Forward Rate Note
FTP	Fund Transfer Pricing
ICAAP	Internal Capital Adequacy Assessment Process
i.e.	That Is
IMA	Internal Model Approach
IFRS	International Financial Reporting Standard
IRGC	International Risk Governance Council
IRR	Interest Rate Risk
IRRBB	Interest rate risk of the banking book
IT	Information Technology
IVaR	Incremental VaR
JIBAR	Johannesburg Interbank Agreed Rate
JSE	Johannesburg Securities Exchange
LIBOR	London Interbank Offered Rate
MPC	Monetary Policy Committee
NCDs	Negotiable Certificate of Deposits
NII	Net Interest Income
NPV	Net Present Value
OBS	Off - Balance Sheet
OECD	Economic Cooperation and Development
OTC	Over-the-Counter
P&L	Profit and Loss
PPS	Policies Procedures and Standards
PRMIA	Professional Risk Managers' International Association
PWC	PriceWaterhouseCoopers
QRM	Quantitative Risk Management
RaRoC	Risk adjusted Return on Capital
Repo-rate	Repurchase agreement Rate
RMSC	Risk Management Sub-Committee

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RSA	Risk Sensitive Asset
RSL	Risk Sensitive Liability
ROA	Return on Asset
RODS	Rand Overnight Deposit Swaps
ROE	Return on Equity
SARB	South African Reserve Bank
SEC	Securities Exchange Commission
SIRR	Short-term Interest Rate Risk
SMBs	Small and Medium-sized Banks
SOX	Sarbanes-Oxley
SVA	Shareholders Value Added
UK	United Kingdom
USA	United States of America
VAR	Value at Risk

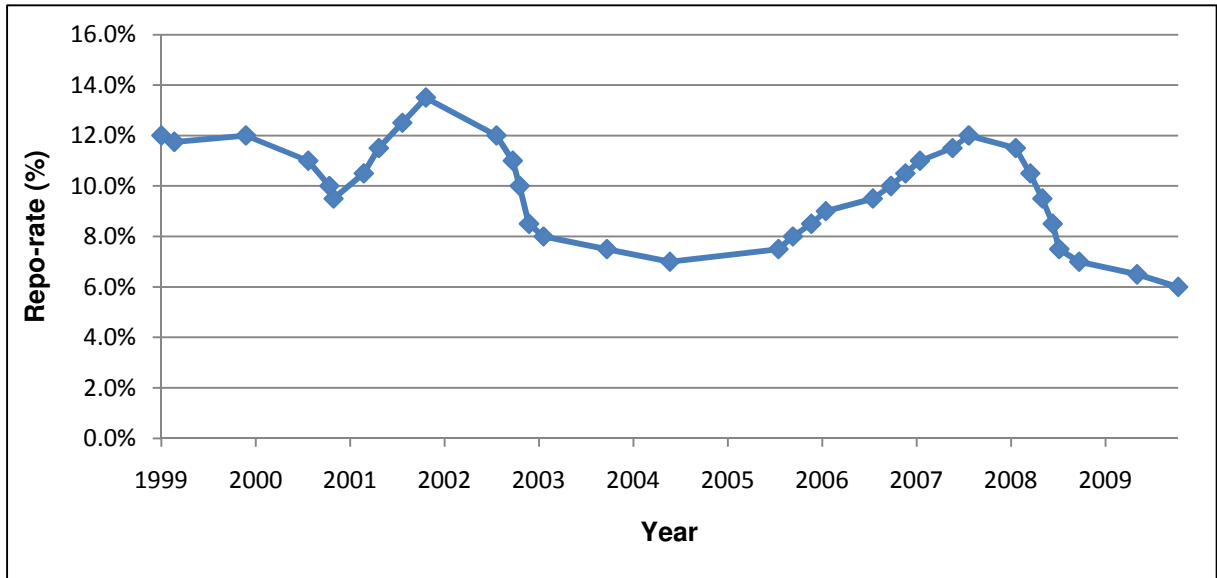
CHAPTER ONE: INTRODUCTION

1. RISK MANAGEMENT OVERVIEW

The new capital adequacy framework, commonly known as the Basel II Accord, highlighted the need for the implementation of risk management practices that are cutting edge. The ability to identify and mitigate risk by implementing financial risk management strategies has become an imperative in the pursuit of achieving superior performance in the global business arena. New challenges related to risk measurement and mitigation are facing the risk professionals in the banking industry around the world.

The level of interest rates plays a pivotal role in a country's economic development through the central bank's monetary policy. In the South African context, as well as that of other countries, the central bank periodically adjusts the short-term interest rate to keep the inflation within the target – inflation targeting. In South Africa, this strategy was first adopted in 2000, based on the expected inflation forecasts. For instance, according to Reuters, the South African Reserve Bank (SARB) raised the repo-rate by 200 basis points to curb inflation from June until the end of 2006, and as illustrated in the SARB repo-rate curve data, this is after a total rate cut of 650 basis points between 2002 and 2006 (See Figure 1.1).

In the banking industry, including private and investment banks, there is an interest rate exposure window when the central bank adjusts the short-term interest rate – the repo-rate. The problem is how banks are going to identify, measure, mitigate, and monitor and report the risk exposure and keep it within a desired risk tolerance level. Facing new risk factors, banks need to adjust their internal risk management models. The four major commercial banks in South Africa have not had an explicit model dealing with the repo-rate and the relevant short-term interest rate risk (SIRR) changes (Hochfelden, 2008).

Figure 1.1 The Historical Repo-rates in South Africa, 1999-2010

Source: SARB (2010)

Financial risk management, especially market risk management (interest rate, exchange rate and equity), are essential elements of the bank's strategic management. For instance, in 1995, Barings Bank collapsed due to a Singapore-based trader who took unauthorized futures and options positions which brought about huge financial losses overnight. Another prime example is that of a treasurer of Orange County who invested much of the county's assets in a series of derivative instruments which locked in the prevailing rate. In 1994, interest rates rose, and Orange County went bankrupt losing \$1.7 billion (Dempster, 2002). In 2007, the subprime interest rate crisis originated from the American housing and mortgage loan markets causing substantial losses to real estate investors as well as banks.

The banking industry needs a modelling process to follow closely to manage market risks, especially the short-term interest rate exposure, which is one of the major risks in the banking sector. Based on the existing Asset-Liability Management (ALM) interest rate risk (IRR) model, the adjustments are required as new phenomena and problems are always going to be faced. For example the new Basel II Accord was implemented in January 2008 within the South African banking sector and the world oil price hike worsened the SARB inflation targeting policy creditworthiness. The Professional Risk Managers' International Association (PRMIA) conducted a Basel II implementation risk survey worldwide in July 2007 and one of the findings said that fifty two per cent of bankers and consultants agreed that the models used

for Basel II is at least somewhat different from their current internal economic capital models (PRMIA, 2007: 4). In addition, forty seven per cent of bankers indicated that they would pursue the advanced approach for their internal models (PRMIA, 2007: 8).

2. STATEMENT OF THE PROBLEM

In business terms, without a sound IRR management model, i.e. policies, procedures and systems, banks could suffer avoidable financial losses, resulting from, for example, the volatile market environment to which they are exposed. As was stated before, this study focuses mainly on IRR which is related to liquidity risk and the other risks such as capital risk and market risk. Moreover, SIRR is interpreted based on the facts that the repo-rate is a short-term rate, IRR hedging instruments such as swaps and forward rate agreements (FRA's) are short-term based instruments, and the banking book IRR management processes have a short-term focus.

Specifically, advances and deposit liabilities are the core items in the banking portfolio and also sensitive to short-term interest rate fluctuations. Banks tend to mostly lend long term and borrow short term. This exposes them to financial losses when short-term interest rates increase due to endogenous (determined by the individuals in the economic system) and exogenous (controllable by central bank) factors (Van Zyl et al. 2003; Makinen, 1977).

As an example of an endogenous factor (being within a country's economic system), it could be that the SARB adjusts the repo-rate which causes the prime overdraft rate changes which in turn gives rise to the reactions from a country's economy such as changes in consumption; however, in the case of an exogenous factor it could be that SARB calculates the Consumer Price Index excluding mortgage rate changes (CPIX) which in turn influences the repo-rate, making CPIX the exogenous factor outside of a country's economic system (Burrows, 2008).

The SARB Monetary Policy Committee (MPC) meetings are held every year in February, April, June, August, October and December, whereas the data needed for the actual inflation calculation from the SARB Quarterly Bulletin is only released at the end of March, June, September and December each year. Every MPC meeting will make an announcement of the repo-rate based on the expected or actual inflation rate. The SARB is in the position of calculating the inflation rate based on its formula every quarter in a year for the previous quarter and the inflation rate for the whole year at year end. At the same time it makes the

inflation forecasts for the current quarter and the next two years. For instance, in the February-meeting the SARB makes the inflation forecasts for the first quarter of the year and the next two years and calculates the actual inflation rates in the April-meeting for the first quarter of the year and adjusts the forecast for the next two years if deemed necessary since data at that point is available. At the same time, commercial banks take the SARB's inflation forecasts and actual inflation rates and in turn the repo-rate rate as a reference rate and perform their own interest rate forecasts and in turn adjust their own lending and deposit rates respectively (Kershoff, 2007). In addition, the MPC meeting forms inflation forecasts and calculates actual inflation for both the short term and the long term, subsequently adjusting the repo-rate. Hence, the issue about how to forecast and calculate inflation rates and how to adjust the repo-rate thereof is rather a subjective decision, which is outside the scope of this study. However it reflects the uncertainty of repo-rate changes caused by this decision-making process.

Typically, commercial banks will finance long term fixed-rate loans – as opposed to variable-rate loans which adjust periodically depending on the specific contract terms – together with short-term floating/variable-rate deposits. This is because borrowers in the commercial and mortgage loan markets often demand fixed-rate loans, which is consistent with the normal upward-sloping yield curve (Koch & MacDonald, 2000). The United States of America (USA) housing mortgage loan market is dominated by thirty-year fixed-rate loans. As reflected in the annual financial statements of commercial banks in South Africa, the values of mortgage lending dominates the loan and advances on the balance sheet, even though the fixed-rate proportion is not as much as in the USA (Van Rensburg, 2007).

The commercial banks borrow a large portion of funds in Rand value – even though it is a relatively small percentage compared to the asset value on the balance sheet – through the repo market from the SARB to cater for liquidity risk caused by, for instance, early withdrawal of deposits. The principal plus repo interest have to be repaid within a period as short as overnight as termed in the repo agreements (Kershoff, 2007).

Therefore, the problem is that banks will suffer interest income losses when the repo-rate increases due to the SARB inflation targeting monetary policy, since banks lend the funds at a lower fixed rate for a longer period of time based on the SARB's inflation expectation (that is the initial repo-rate plus certain basis points to cover costs and profits). The fixed-rate loan

SIRR Management Process of Commercial Banking

maturities are usually in the range from three-month to ten-years, which are longer than the two months till the next MPC meeting (Kershoff, 2007). The longer the period of the fixed-rate loan, the greater the loss if the rising rate environment continues. Then, at the next MPC meeting, just two months later, the committee adjusts the repo-rate based on the actual inflation rate since expected inflation and actual inflation are rarely the same in the short term (Koch & MacDonald, 2000).

Assume that there are no significant portfolio structure changes during the two month period between two MPC meetings. On the one hand, when interest rates are rising, the income on the fixed-rate loans will not earn more; the floating rate deposits bear a higher interest cost which means that a lower Net Interest Margin (NIM) ($\text{NIM} = (\text{loan interest income} - \text{deposit interest expense}) / \text{earning assets}$) will result. On the other hand, the profit and loss (P&L) situation is related to the option risk when there is a declining interest rate expectation. The fixed-rate loans lose since borrowers refinance at a lower rate; the floating-rate deposits bear the risks of having to pay depositors back far in advance of final maturity, then a lower NIM will result due to the lower opportunity income and higher opportunity expense. In the short term, the banks could use the funds borrowed from the repo market to generate new lending business at a lower offer rate due to the general declining rate environment, whereas the lost deposits will limit the loan extension and consequently may damage banks' long-term profitability. To solve this liquidity risk, banks have to offer a higher than market rate to attract deposits. In the declining interest rate environment, if option-free loans and deposits are assumed, NIM will increase due to an increased interest income and a decreased interest expense if more loans can reprice than deposits in the short-term maturity bucket. In practice, most loans and deposits have implicit/embedded options allowing prepayment of loans and early withdrawal of deposits by banks' clients, even though not stipulated explicitly in the contracts (Koch & MacDonald, 2000).

The Value-at-Risk (VaR) technique is applied based on both NIM and Net Present Value (NPV) of balances in the balance sheet as target variables to measure the minimum loss at a certain significance level. VaR using NIM is actually called Earnings at Risk (EaR) which has a short-term view. In comparison, VaR using NPV of balances in the balance sheet has a long-term view.

Moreover, measurements of the option risks, that is, when borrowers and lenders plan to

exercise their options embedded in contracts, will also be incorporated in VaR simulation methods.

As mentioned above, the problem is how banks are going to identify, measure, mitigate and monitor risk exposure and keep it within a desired risk tolerance level and minimum capital requirement. The Basel II Accord raises new Policies, Procedures and Standards (PPS) for managing SIRR, together with the inflation targeting policy-induced short-term interest rate fluctuations in the South African context. It is therefore imperative for individual banks to review their short-term approach to risk management modelling processes and make necessary adjustments to comply with new regulations. The Basel II capital framework consists of three Pillars where the first pillar represents a significant strengthening of minimum requirements as set out in the 1988 Accord while the second and third pillars represent the innovative additions to capital supervision (FirstRand Group, 2008). Basel II incorporates three new documents issued in 1996, 2004 and 2005 respectively (PRMIA, 2007: 5).

There are many other supporting papers issued after 1988. One important paper that relates to this study is the “Principles for the Management and Supervision of Interest Rate Risk” which was issued in 2003 to support Pillar Two approach to IRR in the banking book of new capital framework (Basel Committee on Banking Supervision, 2004). For instance, Basel I made simplified assumptions about IRR such as the static rules and it has not kept pace with advances in sound management practices such as securitization and the adoption of more advanced risk measurement techniques. Hence, requirements are established for those advancements such as stress-testing to get insights into banks’ performance in extremely volatile market environment (FirstRand Group, 2008).

VaR is a major tool in measuring such downside market risks, but it has a few flaws. Financial derivatives could be easily employed to hedge against such losses since banks are major derivative dealers, but these instruments create risks as well.

Another problem that banks face is how to minimize or avoid such shortcomings and risks when using the VaR technique and derivative contracts in developing the modelling process.

In the risk modelling process, the VaR technique is applied in three ways, that is variance-covariance, historical simulation and Monte Carlo simulation, to measure risk on both ex-post

and ex-ante bases. Through back-testing the VaR model, it is designed to monitor if the risk limit has been exceeded. The interest rate specific hedging tools such as FRA's, interest rate swaps, interest rate futures and caps and floors are deployed in the risk hedging stage and risk-return comparisons are made in determining the best hedging strategy.

To summarize, South African commercial banks are facing the new challenges of Basel II implementation and the uncertainty of inflation targeting policy-induced repo-rate fluctuations. Apart from regulation, banks' internal short- and medium-term IRR management processes need to be re-assessed in order to take into account new risk factors such as regulation, inflation and market risks. The three factors-induced IRR is managed through a risk management modelling process by using VaR techniques and derivatives contracts. Likewise, shortcomings and flaws in the modelling process need to be addressed and minimized.

3. OBJECTIVE OF THE STUDY

3.1 Main Objective

The main objective of the study is to carry out a survey of banks in South Africa to determine, among other important risk and banks management issues, whether there are grounds for the development of a SIRR management system or model. The survey will be used as the primary source of information. Other factors also surveyed will also be included to gain an understanding of the current state of financial risk management in banks in South Africa.

In addition to the main survey, preliminary research by way of personal informal interviews with the major four commercial banks' asset and liability risk managers and risk management section of PriceWaterhouseCoopers (PWC) in Johannesburg South Africa will be conducted to develop a more complete understanding of the current risk management process. The Bureau of Economic Research (BER) at the University of Stellenbosch will also be consulted regarding monetary policy implementation.

3.2 Sub-objectives

The secondary objective will be to propose a broad outline of a SIRR model or system.

Primary data to support this objective will be gathered by way of a literature review, interviews and survey of all banks in South Africa. After a review of past literature in the field of bank risk management and in particular risk modelling process, information on current practices of the SIRR identification, measurement, mitigation (hedging via derived financial instruments) and monitoring and reporting, which are the four elements of the financial risk management process will also be gathered.

The proposed SIRR model will depend on the outcome of the above sources. If a significant number of the banks feel that the development of such a system can add value to bank risk management, an outline model will be proposed.

4. RESEARCH METHODOLOGY

Data for this research will mainly be gathered by way of a literature survey and a survey questionnaire of all banks in South Africa. The focus of the review will be on the IRR management (with a focus on SIRR) process in banks. The secondary and primary research will comprise mainly sources as set out below.

4.1 Literature Review

Academic books and journals related to banking IRR management are consulted in order to lay a theoretical foundation. Considering the rapid development of the financial industry, the books and journals are mainly chosen from the publication year 2000 and onwards. Together with Basel II IRR management guidelines as well as the past three years' risk reports of locally registered banks from 2005 to 2007, it is aimed to develop the best practice PPS by combining current practices from each bank and those which are most consistent with the theoretical principles and Basel II guidelines. The four major banks will be focussed on, as the top five banks in South Africa account for more than 89.6% of total assets of the South African banking sector and four of the five largest banks are dominating loan and deposit businesses as stated in the SARB 2005 annual report.

Apart from the literature review and informal interviews, use will also be made of the information that can be obtained from the respective web sites of selected South African banks. Data will also be gathered from the web sites of individual banks, in particular, the four major commercial banks' annual financial reports (ABSA, Standard Bank, FirstRand

Group and Nedbank). Furthermore, the SARB web site is used as the source of the inflation targeting policy and banking regulation.

4.2 Empirical Research

Although it is not the main objective of the study, a broad theoretical model will be developed based on the literature review and survey of South African banks. The “theoretical” SIRR modelling process - which incorporates both recent literature studies and current risk management practices in the South African banking sector - will be presented in the form of a survey questionnaire to the risk managers of locally registered banks for comments. The feedbacks received are used to suggest a model.

5. IMPORTANCE OF THE STUDY

The recent financial crisis that has played itself out since 2007 again highlighted the importance of proper financial risk management techniques and a true assessment of actual exposure to risk. The South African banking sector has not been affected as much as the European and American banks. However, we have to learn from mistakes made and prepare ourselves for crises still to come.

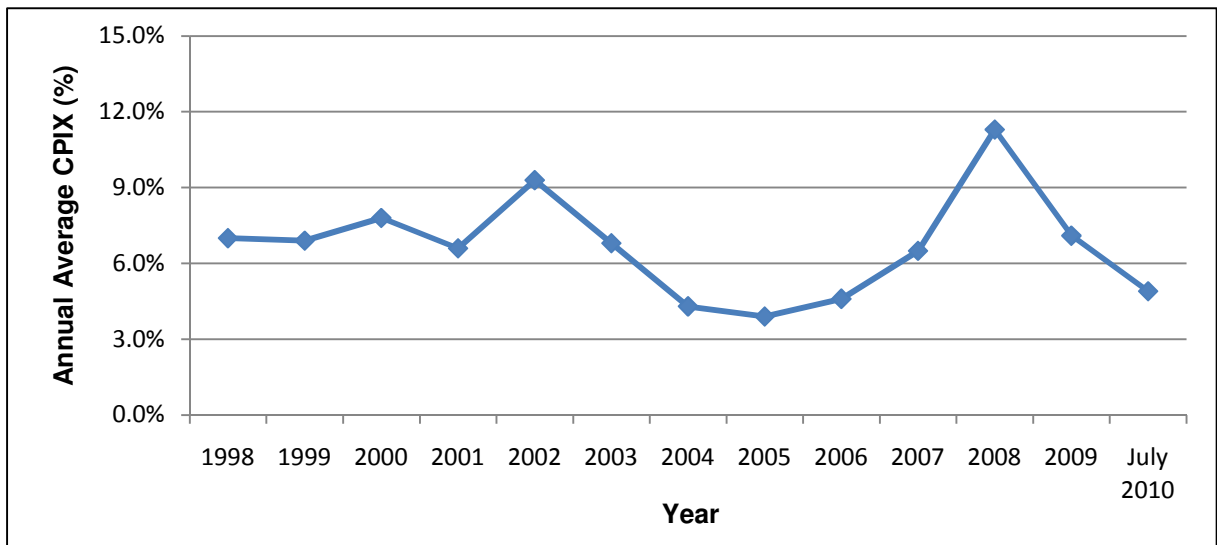
The volatile South African financial markets, as reflected in the foreign exchange and interest rate fluctuations over the past decade, makes it imperative for the banking sector to effectively manage its risk exposures in order to minimize or eliminate potential financial losses due to especially unstable short-term interest rate movements and in doing so increase shareholders' wealth.

The 1997/1998 Asian and 2007/2008 global financial crises gave rise to an adverse impact on the economies of countries such as Thailand, South Korea, the USA and the United Kingdom (UK). The banking industry is managing a vast volume of fund transactions and portfolios of investments. The banks are intricately involved in the financial markets and are therefore exposed to a large number of risk factors, so a sound banking system is essential to a country's economic development.

The inflation targeting policy of the SARB in 2000 aimed to keep the inflation rate (CPIX and Consumer Price Index (CPI)) within the three to six per cent range. After a few years of stable

inflation between 2004 and 2007, the trend broke out of the target range mainly due to the world oil price shock between 2006 and 2008 (See Figure 1.2). Therefore, the SARB MPC meeting on hiking interest rates in order to control the inflation rate, adds a further uncertainty to the movements of short-term interest rates giving rise to a yield curve change which negatively impacts on bank profitability over the short term.

Figure 1.2 The Historical Averages of CPIX and CPI in South Africa, 1998-2010



Note: All figures are rounded. The base year is 2000. In 2009, CPIX was phased out and CPI was used instead. The 2010 average CPI was the average between January and July 2010.

Source: Statistics South Africa (2010)

Basically the relationship between inflation rates and interest rates is that if the inflation rate increases (decreases), the repo-rate increases (decreases), causing the prime overdraft rate to increase (decreases), and in turn the other lending and deposit rates of banks increase (decrease).

This study will highlight what causes short-term interest rate volatility and how the banks forecast and manage the SIRR with reference to the inflation targeting policy.

The two pertinent yield curves are the repo-rate and the prime overdraft rate. All the other lending rates and deposit rates are linked to the prime overdraft rate, which means they are obtained by adding a certain premium over the prime overdraft rate to cover costs and profits and when the prime overdraft rate changes by a certain number of basis points, they generally also change in the same direction by the same number of basis points, which is a parallel yield

curve shift, even though nonparallel shifts are also possible. Moreover there is a stable relationship between the repo-rate and prime overdraft rate.

6. SCOPE AND LIMITATIONS OF THE STUDY

The banks have policies and rules in releasing sensitive statistics to outsiders. It is therefore difficult to obtain information about actual exposure and internal procedures and ratios. The survey can therefore only deal with aspects that do not involve such issues.

The model for managing SIRR may conflict with other risk management functions within a specific bank. The banks need to adjust their SIRR model (if such a model is present) in order to integrate it into the whole strategic or bank-wide risk management framework. Although the study suggests guidelines for possible adjustments, the latter falls outside the scope of this study.

7. BRIEF OVERVIEW OF THE CHAPTERS OF THE STUDY

The following is a brief overview of the chapters to be covered in the study with a summary of the main points of discussion. The body of the study consists of chapters that discuss the enterprise-wide risk management (ERM), tendencies of bank risk management in South Africa and globally, and bank IRR management including four key elements risk identification, measurement, mitigation and reporting and monitoring. Empirical findings present the current practices of bank risk management and a generic SIRR framework for the South African commercial banking sector. Finally, the study concludes with the weaknesses of current practices, areas for improvement and future prospects.

CHAPTER TWO: REVIEW OF THE BANK RISK MANAGEMENT PROCESS

This chapter serves the purpose of giving an overview of the bank risk management processes. This is done through discussing each individual element and the related concepts involved in the process. Aspects covered include risk management processes (long-term and short-term), risk identification, risk measurement (VaR), risk mitigation (financial derivatives) and risk monitoring and reporting, the development of bank risk management practices and the differentiation of banking businesses. The discussion of risk management concepts lays the foundation for understanding banking risk management processes as a

whole.

CHAPTER THREE: ENTERPRISE-WIDE RISK MANAGEMENT

In this chapter, it is intended to introduce the ERM framework which is commonly adopted in four major commercial banks in South Africa, and explain how it works in the banking sector as a whole through the examination of annual risk reports. The PPS is gathered and compiled by combining current practices adopted in each bank with prevalent international risk guidelines. Moreover, relevant sections in the Basel II and the concepts of risk governance and internal control are also referred to. The key concepts mentioned in this chapter are broadened in later chapters.

CHAPTER FOUR: TENDENCIES OF BANK RISK MANAGEMENT IN SOUTH AFRICA AND GLOBALLY

The aim of this chapter is to present an overview of the IRR management process and its component stages of major global banks as well as the South African banks. Specifically, the global banks are chosen according to the surveys done by the consulting company and the findings are sourced thereof. The locally registered banks in South Africa are reviewed in terms of their risk management processes through annual reports of each bank. This chapter determines the IRR management processes that are currently used in the major global banks and local banks in South Africa. The chapter discusses key issues such as the ERM framework, risk governance, risk management processes and its elements.

CHAPTER FIVE: BANK INTEREST RATE RISK MANAGEMENT

This chapter discusses key issues in bank risk management such as risk management structures, risk management systems and risk management processes related to IRR. The key stages of IRR management process are discussed in detail: risk definition, identification and prioritisation, risk measurement, risk mitigation, and risk monitoring and reporting. Issues of risk aggregation and capital allocation are also explained. The chapter concludes with banking book IRR management and systems, which explores the future areas for improvement and leads to the next chapter of empirical research of the banking book IRR management process and framework development with a short-term focus.

CHAPTER SIX: EMPIRICAL FINDINGS AND THE PROPOSED FRAMEWORK

This chapter presents the empirical findings on the current practices of banking book IRR management. An outline of a SIRR management process is developed and explained step-by-step in flow charts. The new process incorporates the empirical findings and adjustments are made in the design of the process. It can be used as a guideline for an individual bank to manage its short-term banking book IRR.

CHAPTER SEVEN: CONCLUSIONS AND RECOMMENDATIONS

This chapter briefly draws conclusions based on the literature review, survey, and informal interviews. Recommendations for further research are also briefly dealt with.

Comments and recommendations are made on the modelling process in managing the SIRR, and on future improvement in view of the new development, for instance, new risk factors, technologies and regulations (the forthcoming Basel III).

CHAPTER TWO: REVIEW OF THE BANK RISK MANAGEMENT PROCESS

1. INTRODUCTION

In this chapter, theories and applications of banking risk management processes and their elements are reviewed. Previous studies on banking risk management processes and the empirical ones in particular are limited and theory-centred. This chapter intends to review those studies that are related to the elements of the risk management process, that is, elements such as risk identification, risk measurement, risk mitigation, and risk monitoring and reporting practices in the banking sector. In the second section of this chapter, developments with regards to bank risk management modelling in the banking sector with specific reference to the new Basel accord, are explained. The third section discusses the SIRR process as a separate process from the medium-term one which applies to ALM. In the fourth section, the VaR technique is briefly discussed. The next section attempts to clarify some of the SIRR management practices that may apply to banks. The sixth section covers financial derivatives and specifically interest rate related derivative contracts in banking risk management and how they may be used. The seventh section briefly outlines the business of banking. In the last section various banking regulation issues are briefly outlined.

2. THE FINANCIAL RISK MANAGEMENT PROCESS

There is no universal definition of risk management and the process in the banking sector. In this study, two definitions are chosen to describe the banking risk management process. Hallikas, Karvonen, Pulkkinen, Virolainen & Tuominen (2004: 52) state that a typical risk management process of an enterprise consists of risk identification, risk assessment, decision and implementation of risk management actions, and risk monitoring. The Basel Committee on Banking Supervision (1994: 1) states that an adequate risk management process integrates prudent risk limits, sound measurement procedures and information systems, continuous risk monitoring and frequent management reporting.

SIRR Management Process of Commercial Banking

The risk management process relates to communication and the reduction of complexity into simple, understandable terms from which decisions can be made (Gerhard, 2005: 2). In the South African banking sector, the Sponsoring Organisations of the Treadway Commission (COSO)'s Integrated ERM Framework is commonly adopted as a risk management process. The process consists of certain steps which will be discussed in the sections that follow.

In both classical and modern risk management practices, the goal of the financial risk management process remains to be the enhancement of the risk-return profile of transactions and that of the bank's portfolios. Nevertheless, new best practices are more risk sensitive through the development of advanced risk measurement techniques (Bessis, 2001).

A vertical risk management process addresses the relationship between global enterprise goals and business deviations and also between bottom-up and top-down processes of risk management. In comparison, the transversal process addresses risk and return management at horizontal levels in the business hierarchy. Bank-wide risk management suggests some common grounds and frameworks for different risks, although risk practices differ across bank business lines. Many borders between market and credit risk tend to progressively disappear, while common concepts, such as VaR and portfolio models, apply gradually to all risks (Bessis, 2001).

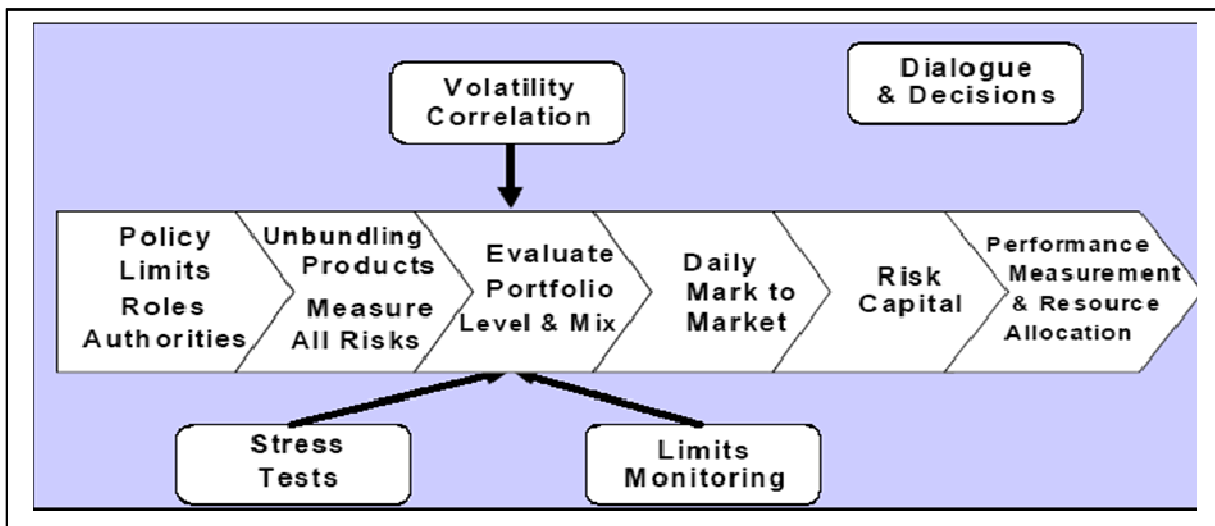
Nederlof (2008) argues that banks with multiple layers of operations should adhere to the following basic steps in risk management:

- Updating the policies and procedures
- Ensuring that adequate capital (according to the prudential requirements of the Banks Act 94 of 1994) exists for the risks taken
- Implementing risk-adjusted reward measures
- Stress-testing all variables
- Conducting "what if" analysis
- Increasing senior managers' and the board's knowledge of risk management
- Expanding reporting to clients

- Refining guidelines and objectives

Most firms today tend to make ERM more a coordinating, information gathering, and technical supportive function for the rest of the organization. The most common activities are risk identification and ranking. On the other hand, aggressive integrated risk management activities are less common, such as measuring and exploiting natural hedges among the totality of the organisation's risks and evaluating risk management strategies on account of risk and return objectives (International Risk Management Institute, 2003). The current general management models implemented in the South African banking sector are based on the COSO's Integrated ERM Framework (Jooste, 2007). This topic will be discussed in detail in chapter three.

Figure 2.1 Bank Risk Management Framework



Source: Wee & Lee (1999, 18)

Figure 2.1 above shows an example of the risk management process which is currently implemented in the majority of global banks. It presents a brief overview of how the risk management process flows from the initial policy limit to final performance evaluation.

2.1 Risk Identification and Definition

The three main broad risk categories in banking are IRR, market risk and credit risk. The pure market risk - generated by changes of market parameters such as interest rates, equity indexes,

and exchange rates - differs from market liquidity risk (Bessis, 2001).

Bessis (2001) defines IRR as the risk of a change in earnings due to the movements of interest rates. Most of the items of banks' balance sheets generate revenues and costs that are interest rate driven. Since interest rates are unstable, so are earnings. Both borrowing and lending at variable rates are risky, since they generate revenues or costs indexed to market rates. Considering opportunity loss and embedded options, the fixed rate borrowing and lending products are risky transactions as well.

In addition, model risk materializes as gaps between predicted and actual VaR values widen. Embedded-option risks are indirect IRRs, which are triggered by changes in interest rates. For example, the depositors and borrowers may exercise their options to withdraw early and prepay whenever they believe the market interest rates become more favourable (Bessis, 2001).

2.2 Risk Measurement

ALM models developed gradually until they became standard mechanisms for managing the liquidity and IRRs of a banking portfolio. Market risk models appeared soon after the Basel guidelines started to address the issues of market risk. They appear sufficiently reliable to allow internal usage by banks, under supervision of regulators, for defining their capital requirements. Economic capital is VaR-based and crystallises the quantified present value of potential future losses by making sure that banks have enough capital to sustain worst-case losses. Such risk valuations may potentially be extended to include all main bank financial risks (Bessis, 2001).

2.3 Risk Mitigation

Banks may utilize derivative instruments to hedge IRR, which increasingly forms part of an organization's risk management policy. Risk management policy will, amongst other things, determine the organization's appetite for risk based on the bank's risk profile, the types of instruments to be used for hedging purposes, and the degree of latitude in executing hedging and/or speculation (Van Zyl et al., 2003). Since there is no way to eliminate IRR, the only option is to modify or transfer the exposure according to the management's future views and to make interest income immune to interest rate changes (Bessis, 2001).

2.4 Risk Monitoring

Bessis (2001) states that periodical reviews and corrective actions are event-driven. A prerequisite for risk-return monitoring is to have measures of risk and return at all relevant levels – global, business line and transaction levels.

The standard tools for risk-adjusted performance, as well as risk-based pricing, are the Risk adjusted Return on Capital (RaRoC) and Shareholders Value Added (SVA) measures. The drawback of accounting Return on Equity (ROE) and Return on Assets (ROA) measures, and of the Profit and Loss (P&L) of the trading portfolio, is that they do not include any risk adjustment (Bessis, 2001). The following section aims to outline the SIRR management process.

3. THE SIRR MANAGEMENT PROCESS

It is important to point out that there is a lack of empirical studies on the SIRR management in the banking sector. In this study, the SIRR is interpreted according to the fact that the repo-rate is short-term in nature as the repo-rate adjustment occurs every two months, hedging instruments against IRR such as swap and FRA are short-term-dated contracts, and the banking IRR management process has a short-term focus due to the short-term more volatile interest rate environment. This section and the remaining sections of this chapter aims to provide an overview on those studies that are most relevant to the current study in terms of the elements involved in the study such as the risk management process, IRR management, VaR, interest rate derivative instruments, and risk monitoring and reporting processes in the banking sector. Therefore, the PPS is developed through combining those guidelines and principles for the above-mentioned framework and process elements in order to guide the current SIRR management process development.

SIRR can be caused by both short-term factors such as near term monetary policy expectations as well as long-term factors such as inflation rate expectations, whereas long-term IRR is mainly caused by long-term macroeconomic factors such as the inflation rate and economic growth rate. For SIRR, it is caused specifically by the sources from the near term monetary policy changes of the central bank in a country. The short-term policy changes also depend on the long term expectations on economic growth rate and inflation rate. The major

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factors giving rise to the market expectations is based on the central bank's short-term and long-term views on inflation and economic growth. Therefore, the long-term and short-term interest rates are interconnected in the sense that central banks adjust the short-term end of the yield curve based on its long term forecasts of inflation and in turn interest rate developments (Malz, 2003).

The SIRR management process as a risk subcategory of the IRR management process has received special attention simply due to the recent volatile short-term repo-rate environment in South Africa. Specifically, IRR exposure under ALM as well as the bank-wide risk management framework process is currently managed with repricing GAP analysis since the major IRR exposure of the banking book is derived from the asset- and liability-maturity mismatches and composition. In comparison, in this study, the research problem takes into account the interrelated risk types in the current market risk environment as well as the difference between ALM IRR and trading market risk management processes. SIRR attempts to combine those practices from both risk types in order to adapt to the constantly changing and complex market risk environment. In particular, the non-trading market risk such as banking book structural IRR – caused by differing repricing characteristics of banking assets and liabilities – is influenced by both the trading market risks and the other market and non-market risk sources. According to the ABSA 2007 annual report, structural IRR arises from the variability of income from non-interest bearing products, managed variable rate products and the bank's equity, and is managed by ABSA Group Treasury.

Even though SIRR may not be the major IRR component in current balance sheet structures in South African banks, it certainly exposes banks to future potential losses and the absolute rand value of those balance-sheet portfolios are still fairly large and worth millions of rands. Improving SIRR could further improve the risk management of a bank. By focusing on solving the problem of the volatile short-term repo-rate environment, frequent open-market operations and interbank activities, as well as the unstable inflation rate index in the short-term in South Africa, the SIRR could be based on the VaR technique as the major risk measurement tool due to the fact that it can be applied to manage short-term IRR. The VaR concept is discussed in the next section.

Through a SIRR management process, the risk sources from central bank monetary policy to control inflation can be managed via a framework containing risk identification,

measurement, mitigation and monitoring steps. Specifically, the tools and techniques employed should be of qualitative and quantitative in nature. Risk identification can be done through qualitative impact-frequency and ranking analyses such as sorting the direct observations from past loss figures such as VaR, as well as conducting quantitative regression and principal component analyses that rely on the complicated mathematical and statistical equations and theorems.

The major IRR measurement and sensitivity analysis tools are GAP analysis, as well as VaR including a simulation modelling technique. The choice of techniques varies from institution to institution which, to a large extent, relies on the asset size of the organization. In most cases, the larger the institution, the more sophisticated and expensive the tools employed. Often, more qualitative sensitivity analysis tools and more quantitative tools such as simulation analysis are combined to measure risks (Al-Tamimi & Al-Mazrooei, 2007). Risk mitigation techniques are commonly financial derivative instruments such as forwards, futures, swaps, caps and floors. The decision of which instruments to employ largely depends on each institution's risk-return objective. This stage is conducted more quantitatively due to a higher degree of mathematical and arithmetical calculations for the pricing and valuation of instruments and portfolios.

As to the risk monitoring stage, it is more qualitative that VaR figures are back-tested through testing the hypothesis of the excessions of risk limits periodically, while the quantitative nature is reflected through the statistical analysis on VaR distributions over a predetermined monitoring period.

The remainder of the chapter is devoted to the above-mentioned elements and concepts such as VaR, SIRR management practices, interest rate derivatives, risk management processes in the banking sector. In addition, banking business lines and regulations are briefly explained at the end of the chapter.

4. INTEREST RATE RISK MANAGEMENT TOOLS

The major IRR measurement techniques such as VaR, EaR, repricing GAP analysis, and other sensitivity analysis tools are discussed in chapter five where the risk measurement stage is explained. The VaR technique is chosen for the study for two reasons.

Firstly, it has to have an intuitive interpretation – which applies to VaR. Secondly, it must be

possible for a regulator to check whether risks in the portfolio are captured properly, in other words, back-testing must be possible. It is where VaR has one of its greatest strengths even though it has certain drawbacks (Stahl, 2005). This topic will be discussed further in chapter five. In practice, the quantity of banks applying the VaR technique is steadily increasing, and not only as a result of regulatory requirements (Rogachev, 2007: 73). This is also the case for the South African commercial banking sector where all four major banks have employed VaR as the main market risk measurement technique. More importantly, the VaR technique is a short-term instrument in the sense that it is used mainly to measure the daily-P&L exposure and the portfolio P&L due to small changes in the underlying risk factor. Therefore, the VaR concept fits into the short-term risk management process.

The subsections that follow will approach the VaR concept from the aspects of definition, history and application, measurement, measurement errors, recent developments, limitations and improvement of the VaR technique.

4.1 Definition

The four most important risks of trading include valuation risk, market risk, counterparty credit risk and operational risk. Market risk is the potential future loss that may occur because of a decrease in market value (Dempster, 2002).

Dempster (2002) states that VaR provides a measure of the market risk of a portfolio due to adverse market movements under normal market conditions. When the joint behaviour of a large number of portfolios is considered, it is usual to adopt multivariate normal distributions, though much work goes into the computation of the variances and covariances required (Dempster, 2002). VaR can be defined as the worst loss that might be expected from holding a security or portfolio over a given period of time under a specified level of probability (Chance, 2003). The minimum VaR with a given probability is preferred, which is a conservative approach as it reminds that the loss could be more severe (Chance, 2003).

4.2 History and Application

The VaR concept has been taken up for market risk measurement by the financial regulators in the 1996 Basel accord supplement and has subsequently been extended to measuring ALM risks, credit risks and other financial risks over a longer time horizon (Dempster, 2002).

VaR is the most widely used tool to quantify probabilities of large losses. Originally started as an internal management tool by a number of banks, VaR gained a higher profile in 1994 when J.P. Morgan published its Risk Metrics System. Moreover, it has led to Risk Metrics spin-offs where market data and software systems were based upon previously published approaches. Risk Metrics has become a major player in the rapidly growing market for so-called ERM solutions. ERM is appropriate to the world's financial institutions at all levels. This market trend will no doubt continue under the pressure of the new Bank for International Settlement (BIS) Capital Adequacy Accord (Dempster, 2002).

Subsequent books aimed at financial academics and traders reveal the statistical basis behind VaR. Despite the complexity of financial data management that these systems require, the statistical principles behind them are quite simple and practical to apply (Jorion, 1996).

VaR is the most widely and easily used technique to measure the possible loss from market risk. It can also be used to measure the loss from credit risk and other types of risks (Chance, 2003), although this is subject to much greater complexity. Determining the VaR requires modelling the distribution of values at some future point in time. In order to define various loss percentiles, each value in a distribution corresponds to a confidence level. Moreover, VaR provides the measure of economic capital – the capital required to absorb potential unexpected losses at the preset confidence level. Once defined at the bank-wide level, the risk-adjusted performances remain to be defined through both capital allocation and transfer pricing systems (Bessis, 2001).

Bessis (2001) presents three reasons for the development of the VaR concept. First, it provides a complete view of portfolio risk; second, it measures economic capital; lastly it assigns values to risks.

A ten-day VaR can be approximated by multiplying the daily VaR by the square root of ten. VaR can also be used to record employees' activities on the basis of the risk-adjusted return on capital generated by their activities. It is referred to as risk budgeting (Crouhy et al., 2001).

Risk limits expressed in VaR units can easily be aggregated via the firm – from the business line at trading desk level, to the very top of the corporation. The drill-down capacity of a VaR system both allows risk managers to detect which unit is taking the most risk, and also identifies the type of risk to which the whole bank is most exposed. Managers and

shareholders, as well as regulators, can decide whether they feel comfortable with the level of risk taken on by the bank in terms of VaR units (Crouhy et al., 2001).

The VaR system allows a firm to assess the benefits not only from portfolio diversification within a line of activity, but also across businesses, hence VaR has become an internal and external reporting tool. Moreover, the rating agencies take VaR calculations into account in establishing their rating of banks (Crouhy et al., 2001). Many companies also use VaR as a measure of their capital at risk (Chance, 2003).

4.3 Measurement

VaR takes account of the correlations between the various risk factors and measures risk in a portfolio framework. This single number can then be easily translated into a capital requirement (Crouhy et al., 2001).

4.3.1 Three Methods of Market Risk Measurement

The methods or approaches which may be used to measure VaR are:

- SPAN (1995) developed by the Chicago Mercantile Exchange
- Securities Exchange Commission (SEC) rules of the National Association of Securities Dealers of America
- Quantile-based VaR method by Dowd (1998)

4.3.2 Three Methods of Calculating VaR

Couhy et al. (2001) discusses three commonly used methods to calculate VaR:

- Analytical variance-covariance matrix approach
- Historical simulation approach
- Monte Carlo simulation approach

The development of Monte Carlo simulation during the mid-1980s resulted in the further analysis of risk and return by major financial institutions and it was more powerful computer chips that were essential components in making this step forward possible (Van Deventer et

al., 2005).

Regulators view stress testing and scenario analysis as a necessary complement to the use of internal VaR models. As VaR is a statistical model, its implementation requires banks to make simplified assumptions regarding risk factors (Crouhy et al., 2001).

VaR is the unexpected loss set by confidence levels. When implementing techniques based on confidence levels and loss percentiles, there is a need for common benchmarks, such as confidence levels, for all players (Bessis, 2001). In addition, Bessis (2001) states that the portfolio VaR model has the capacity to quantify concentration and diversification effects on the portfolio risk.

A comprehensive and integrated risk management system links measures with their specific sources of risk. The VaR for market and credit risks, and the ALM measures of IRR, are specific to each risk. They are more appropriate for bank-wide risk management systems because they allow the control of each risk upstream, rather than after the fact (Bessis, 2001).

4.4 Measurement Errors and Back-testing of a VaR Model

The accuracy of the VaR estimate depends on the precision of the measurement of the mean, the variance, and/or the quantiles of the distribution of the portfolio return. Back-testing of the VaR model simply means checking whether the realized daily returns are consistent with the corresponding daily VaR produced by the model, at the given confidence level. The Delta-Gamma-Vega-Rho-Theta (DGVRT) approach, offers a fairly accurate way of calculating the VaRs of portfolios with derivatives and hybrid investments that incorporate embedded options. It should be mentioned that VaR is based on history which according to Crouhy et al. (2001) is an inherent weakness, as history may not necessarily repeat itself.

4.5 Recent Developments

Morris et al. (1999) found that interest rates and credit spreads may be negatively correlated for short horizons but exhibit positive correlation for the long horizons typically employed in credit risk models.

Crouhy et al. (2001) propose that there are two supplementary measures – Incremental VaR (IVaR) and Delta VaR (DVaR) that may help risk managers determine which of the

component risks contribute most to total risk. Moreover, the Dynamic VaR framework assesses the risk of portfolios over long time horizons (Crouhy et al., 2001).

Dempster (2002) states that market and credit risk models could be combined to obtain a complete picture of the risks faced by the bank. He also mentions that Extreme Value Theory (EVT) characterises the lower tail behaviour of the distribution of returns without tying the analysis down to a single parametric family fitted to the whole distribution. Within the actuarial world, the Dynamic Financial Analysis (DFA) and Dynamic Solvency Testing (DST) have been heralded as a way forward for integrated risk management of the investment and underwriting risks to which an insurer or bank is exposed.

In a working paper titled “Put Option Premiums and Coherent risk Measures”, Robert Jarrow argues the virtues of put premiums as a particularly high quality measure of risk. Other measures of risk have, however, understated true risk in a more subtle way (Van Deventer et al., 2005).

Following the new Basel II accord, the VaR concept has been applied to also measure the operational risks. This, however, falls outside of the scope of this study.

4.6 Limitations of VaR

The main VaR modelling drawback is that it is highly demanding in terms of data (Bessis, 2001). Moreover, VaR is not a coherent risk measure in that it does not support the subadditivity – portfolio diversification – property (Dempster, 2002).

VaR does not give a comprehensive picture of risk. It shows only the risk pertaining to bad outcomes, and does not reflect the good side of risk. A bank could literally have exposure to thousands of risks. Consolidating the effects of these exposures into a single risk measure can thus be extremely difficult (Chance, 2003).

Crouhy et al. (2001) argue that VaR does not provide any indication of how much any actual loss will exceed the VaR figure. They recommend that Extreme Values at Risk (EVaR) is the expected loss in the first quantile tail, provided that the loss exceeds VaR.

Although controversy surrounding this issue remains, VaR as a risk measure is unlikely to be rejected in the foreseeable future. It conveys, in a single number, a great deal of information

on the magnitude of risk. It should not, however, be used in isolation (Chance, 2003).

4.7 Improvements and Supplements to VaR

VaR is a less reliable measure over longer time periods. The danger posed by exceptional market shocks, which are often accompanied by a drying up of market liquidity, can only be captured by means of supplemental methodologies such as stress testing and scenario analysis (Crouhy et al., 2001).

Chance (2003) considers three variations of VaR – Cash Flow at Risk (CFaR), EaR and Expected loss in excess of VaR, but these will not be discussed further.

The next section discusses SIRR management practices in the banking sector where VaR is employed as a major risk measuring tool.

5. THE SIRR MANAGEMENT PRACTICES IN BANKING

In the context of commercial banks, IRR and short-term risk in particular are the major risk exposures due to deposit and loan transactions on a daily basis and also the large proportions of these business lines on the balance sheet. The subsections that follow will cover the definition of IRR, the current risk management approach, the IRR management practice, the IRR management evolution and risk capital, and lastly the Reserve Bank inflation targeting policy.

5.1 Definition of IRR

The simplest form of IRR is the risk that an asset such as a loan asset or deposit liability will earn less due to a reduction or increase in market interest rates. The other major banking risks, to name a few, that are interrelated to IRR are exchange rate, inflation rate, credit and embedded-option risks (Crouhy et al., 2001).

The Reserve Bank's accommodation rate (repo-rate) has a major impact on money market interest rates and consequently on other interest rates and prices in the economy (Van Zyl et al., 2003).

5.2 Current Approaches to the Management of the IRR of a Portfolio

Most financial institutions employ some combination of the techniques such as the eighty/twenty rule, GAP analysis and stress testing to manage IRR. Net income simulation was usually used to measure the annual cash flow of a bank portfolio. However the use of this technique is no longer fashionable due to the fact that accounting income does not represent the actual cash flow of a company (Van Deventer et al., 2005).

Concerning the maximum risk limits for the organisation as a whole, they should not be implemented to such a degree that the return on shareholders' value is negatively affected (Van Deventer et al., 2005).

5.3 IRR Management Practice

Van Deventer et al. (2005) define risk management as a discipline that clearly shows the management of the risks and returns of every major strategic decision at both the institutional/divisional level and the transaction level.

The USA savings and loan crisis of the 1980s was predominantly due to SIRR, together with interest rate-induced credit risk. The Basel committee on banking supervision sets an increasingly strict "separation of duties" requirement (Van Deventer et al., 2005).

Insurance companies and commercial banks use a mixture of mark-to-market risk/return management and a variation on financial accounting called transfer pricing (Van Deventer et al., 2005). Uyemura and van Deventer (1993) focus on the common sense of integration of risk management with shareholder value creation in financial risk management in banking. Imai and van Deventer (1996) discuss the potential of interest rate term structure models as risk management tools in financial risk management.

Asset and liability risk management in major banks and insurance companies used to be confined to very short-term forecasts for financial accounting-based net income. The best practice consists of using a small number of scenarios for testing net income sensitivity to specific changes in the shape and level of the yield curve. The concept of performance measurement means the assignment of financial accounting profits to each asset and liability on the balance sheet and the subsequent compilation of financial accounting profits for each

business unit (Van Deventer et al., 2005).

Black, Scholes and associate Merton (1973) show explicitly how to incorporate riskiness into security valuation. The study provides the foundation for modern risk management. Merton (1973) and Vasicek (1977) introduced yield curve models that were consistent with the “no arbitrage” foundation of Black and Scholes and are based on the assumption that the short-term interest rate varies randomly.

5.4 IRR Management Evolution and Risk-based Capital

IRR management is not a new topic, as there were various risk management tools developed to manage such a risk. Examples include duration, GAP and VaR. The Risk-based capital reserve proves to be an effective measure to mitigate risks when unexpected market events emerge.

5.4.1 Risk Management Evolution

The first sophisticated IRR management tool, duration, was developed by Macauley (1938). The next step forward in sophistication was to recognize that yield curves in fact move in non-parallel ways, which allows analysts to move one or more key term structure model parameters, typically including the short-term interest rate, and then observing the effect of the complete yield curve. However, recognition must be given to the fact that there are multiple factors driving the shape of the yield curve (Van Deventer et al., 2005).

Other developments included GAP analysis which also measures interest rate sensitivity and multi-period interest rate cash flows simulation. It may be argued that most of what happens in the risk management and business strategy arena in other financial institutions is a special case of banking business (Van Deventer et al., 2005).

5.4.2 Risk-adjusted Capital

Most leading international banks assign risk-adjusted capital to each asset. The total amount of capital sums across largest consolidated business units are measured either in financial accounting value or market value. The first attempt of the regulators was to define the concept of primary capital on a financial accounting basis. Bank failures dramatically increased through the 1980s, so the primary capital concept was ultimately scrapped. In 1986, the USA

Board of Governors of the Federal Reserve System and the Bank of England announced the concept of risk-based capital. Bankers and regulators quickly noted that the regulations were oversimplified and therefore inaccurate (Van Deventer et al., 2005).

Van Deventer and Imai (2003) discuss the outline of the Basel II in detail. Van Deventer et al. (2005) consider the problems with the Basel II pronouncements. Capital ratios, however derived, are weak predictors of the safety and soundness of financial institutions. They perform considerably worse than models such as Loss Distribution Model of the Federal Deposit Insurance Corporation (FDIC).

5.5 Reserve Bank Monetary and Inflation Targeting Policy

A brief outline of the SARB monetary and inflation targeting policy is given below as it has a material impact on the management of risk in any South African banking institution.

5.5.1 Monetary Policy Instruments of South African Reserve Bank

In South Africa the lending rate, such as the prime overdraft and mortgage rates are directly affected by the repo-rate, which is fixed by the SARB according to its monetary policy objectives. The SARB relies extensively on its accommodation facilities such as open market operations, public debt management, and intervention in foreign exchange markets which the SARB uses to implement its monetary policy and affect interest rates. The interbank market plays a pivotal role in the implementation of monetary policy (Van Zyl et al., 2003). Through its refinancing system as a main mechanism of monetary policy implementation, the SARB provides liquidity to individual banks to meet their daily liquidity requirements. If a bank has a continuous liquidity shortage for a certain period of time, it has to obtain liquidity through either the interbank market or refinancing facilities (SARB, 2007c).

5.5.2 Inflation Targeting

South Africa has had a history of high inflation and a major impact on real returns of financial assets. In order to achieve price stability in the markets the SARB has adopted inflation targeting policies. The SARB authorities agreed on an initial target band for inflation of three to six per cent, with the objective of bringing inflation within this band by 2002. In order to attain the ultimate objective of monetary policy, which is to reach the inflation target, the SARB uses the interest rate as a policy variable and employs various monetary policy

instruments to influence the interest rate (Van Zyl et al., 2003).

The next section considers the principle and use of interest rate derivatives for hedging in the banking sector.

6. THE USE OF INTEREST RATE DERIVATIVES IN THE BANKING ENVIRONMENT

A derivative instrument is a financial contract of which the value depends on the underlying asset. Derivatives transactions are realised through a wider range of financial contracts including forwards, futures, swaps and options. The subsections that follow will briefly discuss the categories of financial derivatives instruments, the hedging of IRR as well as the derivatives risks in the banking sector.

6.1 Categories

Bessis (2001) states that the South African interest rate derivative market is composed of the money market and bond market. There are two main types of derivatives namely forward contracts including FRA's and swaps. The other is option contracts that allow capping or locking-in of the interest rate (cap) or setting a minimum guaranteed rate (floor).

Money market derivative instruments are FRA's, rand overnight deposit swaps (RODS), interest rate swaps, and caps and floors. Bond market derivative instruments include futures and options (Van Zyl et al., 2003).

6.2 Hedging of IRR in Banking

A typical commercial bank pays mainly short-term – JIBAR – rates on deposits and it receives mostly long-term rates based on the bond yield curve from loans. Commercial banks try to ensure a positive maturity gap spread for an upward sloping yield curve. The interest income is sensitive to both change in the steepness and the level of the yield curve. Banks with a large deposit base are net lenders and maintain a positive maturity gap. Their interest income improves with both an upward shift of the yield curve and with an increasing slope of the yield curve. Therefore, an upward sloping yield curve offers the benefit of capturing the positive maturity spread, at the cost of increased IRR (Bessis, 2001). The opposite happens should the yield curve change to a downward sloping yield curve – the bank's NIM will be

negatively affected.

6.3 Financial Risk Caused by the Use of Derivatives

The failure of an organization's risk management systems and processes to identify and control derivative risks has caused major concern amongst bankers. In 1993, Group of Thirty – a leading international association dealing with economic and financial issues – proposed twenty four risk management practices for users and suppliers of derivative products. In addition, the emerging market crisis of 1997 and 1998 casted doubt on the effectiveness of the VaR approach (Bessis, 2001).

Recent developments in the accounting world have also assisted in the achievement of better management of risks caused by derivatives. This takes place through the introduction and adoption of important statements on international accounting practices (Bessis, 2001).

In the last two sections the issues related to the banking business lines and banking regulations are briefly discussed.

7. BANKING BUSINESS

This section briefly explains the two major banking business activities that are relevant to the study. The focus of this study is banking book business and activities.

7.1 Banking Activities

Van Zyl et al. (2003) state that lending and borrowing transactions are traditionally large in retail and commercial banks. Investment banking, including both specialised finance and trading, typically fund operations in the market.

Banks are accepting deposits, notably cheque deposits, and make credit available in the form of overdraft accounts, credit cards and consumer loans (Van Zyl et al., 2003). Banking assets and liabilities generate accrued revenues and costs, of which a large fraction is interest rate-driven. ALM applies to the banking portfolio and focuses on interest rate and liquidity risks. The asset side of the banking portfolio also generates credit risk, while the liability side contributes to the IRR only. In addition, there is no market risk for the banking book (Bessis, 2001).

7.2 Trading Activities

The market portfolio generates market risk. Many market transactions use non-tradable instruments or derivatives, such as swaps and options traded Over the Counter (OTC). The relative weights of the major compartments vary from one institution to another, depending on their core businesses. The amount of equity (shares) traded is, however, typically low in all banks' balance sheets (Bessis, 2001).

Bessis (2001) addresses interest income and Net Present Value (NPV) of the balance sheet of commercial banking commonly as the targets for management policies of IRR. In addition, commercial banks try to increase the fraction of revenues made up of fees in order to make the net income less sensitive to interest rate changes.

8. BANKING REGULATIONS

The theoretical reason for holding capital is that it should provide protection or a buffer against unexpected losses for the bank and ultimately its clients. Without capital, banks will fail at the first rand loss not covered by provisions (Bessis, 2001). The regulatory system has evolved through the years. The 1996 Basel Accord Amendment refined market risk measures allowing the use of internal models, a situation which is still in force. The source of regulations lies in the differences between the objectives of banks and those of the regulatory authorities. Moreover, the new regulation focuses on pre-emptive (ex ante) actions, while still enforcing after-the-fact (ex post) corrective actions (Bessis, 2001).

For market risk VaR, the minimum period depends on the type of products, and their sensitivities to a given variation of their underlying market parameters. A multiplication factor applies to this modelled VaR. Measures of IRR has to do with the sensitivity of the interest income to shifts in interest rates and the sensitivity of the net market value of assets and liabilities. Moreover, the interest margin is adequate in the short term. The current regulation does not require capital allocation to IRR under Pillar I minimum capital requirements. The Basel II accord is considered more appropriate to treat IRR in the banking book under Pillar Two supervisory review, rather than define the capital requirements. Banks' internal systems are the main tools for the measurement of IRR in the banking book. To facilitate supervisors' monitoring of IRR across institutions, banks should provide the results of their internal

measurement systems using standardized interest rate shocks (Bessis, 2001).

SUMMARY AND CONCLUSION

The intention of this chapter is to highlight the aspects sourced from literature that are most relevant from an IRR management point of view. This chapter gives a broad overview of some concepts as it relates to risk management in banking, theories and applications of VaR, financial derivatives and IRR management processes that are mainly used in the banking context. The banking business lines and risk-related banking regulation issues are also briefly discussed.

The four steps of the risk management process are to be discussed in chapter six, which will include detailed theoretical and empirical surveys. The research gap is that most existing studies dealing with risk management focus on either statistical and mathematical analyses or theoretical development. Only a few studies deal with the management of IRR with a very specific short-term focus. As far as could be established there has been no study focusing on the risk created due to the SARB's monetary policy. Concerning the risk management model development, most studies have a broader conceptual focus. They seldom are of a practical nature explaining in greater depth the development of such a model, and hence fall short in the application of necessary and often critical solutions.

The next chapter deals with the ERM framework and risk governance issues that guide the bank's risk management process.

CHAPTER THREE: ENTERPRISE-WIDE RISK MANAGEMENT

1. INTRODUCTION

In this chapter, the ERM concept is discussed. This concept is important as it embodies the management of financial risk at the highest level in the enterprise. It is thus important as all risks that affect the entire enterprise are managed together. It is often said that risk is best managed at the highest level in the enterprise. The financial risk management process in a bank cannot be considered effective if it does not function at this level.

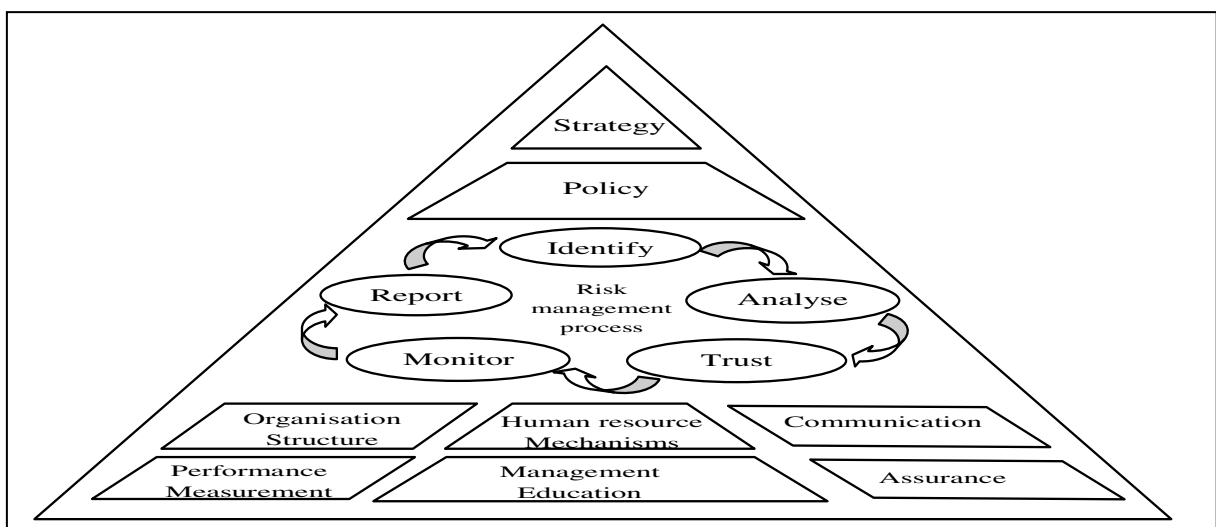
This chapter introduces the ERM framework which is commonly implemented in the four major commercial banks in South Africa. The PPS is gathered and compiled by combining the best practice adopted in each bank in order to generate a comprehensive guideline for individual banks to revise their existing and/or develop their new models. Moreover, the relevant principles in the Basel II, corporate governance, internal control as well as the IRR management guidelines are also referred to. A significant feature of this chapter is that it provides an overview on the ERM and risk management processes and most concepts are briefly touched on, which form the basis for and are extended in the remaining chapters of the study. In section two, the characteristics and functionalities of the general ERM framework are described. Section three discusses the types and properties of the risk management process in the banking sector and goes further by focusing on the transversal process. Section four briefly highlights the corporate and risk governance principles. Section five refers to the Basel II guidelines that are relevant to ERM.

2. THE ERM FRAMEWORK

In chapter two, the risk management process was briefly discussed. This section and section two attempt to define the process and clarify how the ERM process is constructed based on theoretical principles. In particular, the transversal process as discussed in section two will be the focus of the study. ERM itself is a process and this chapter aims to provide an overview of a SIRR within the ERM framework based on the existing frameworks used by banks in South Africa and in other countries around the world.

Many boards of directors have adopted ERM as a process to develop a more robust and holistic top-down view of the key risks to which organizations are exposed (Beasley, Branson & Hancock, 2008). Concerning the risk management framework specific to banking, Bessis (2001) addresses the concept of bank-wide risk management which implies using the entire set of techniques and models to quantify and manage risk. Risk management practices traditionally differ across risk types and business units. This implies that a system should be sought that will facilitate the presentation of concepts, methodologies, techniques and implementations, and make it easier to develop a framework showing how tools and techniques capture differentiated risks and risk management processes in ways that facilitate their global integration.

Figure 3.1 Embedded ERM Model Developed by PWC

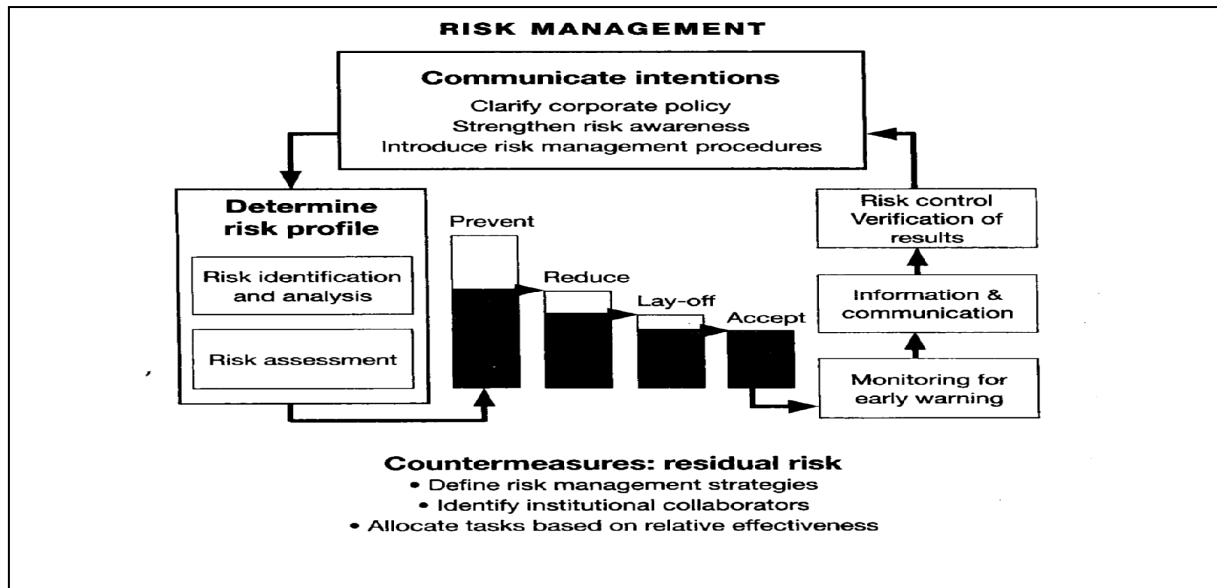


Source: Fadul & Catherine (2007)

PWC (2007) developed an ERM model which shows a pyramid shape as illustrated in Figure 3.1 above. The model starts at the top, at strategy level, and then proceeds downwards to policy formulation. Once the strategy and policy are formulated, the risk management process is found (in the middle) where the process starts at the identification stage through to analysis and eventually again to the identification stage. One layer lower, the organisational structure, human resource mechanisms and communication structures exist. At the bottom of the pyramid, there are elements such as performance measurement, management education and assurance. This model reveals that the risk management process is interrelated with and is affected by all the general management functions in the enterprise. Moreover, every organisation will have some unique factors that must be addressed as part of the design and implementation of ERM. PWC (2007) stated that the critical success factors of the ERM may include the following:

- Obtaining senior management commitment to the concept of ERM and its value to the business
- Recognising and accepting that ERM is an ongoing process and is not limited to episodic activities or initiatives
- Managing the change to an enterprise view of risk through the planning and execution of the appropriate project
- Articulating clearly the organisation's risk appetites and tolerances (also called the risk profile)
- Assessing the degree to which the organisation's culture supports the development of a more robust risk management process and structure
- Developing well-defined business outcomes and benefit measures as basis for monitoring progress
- Creating common definitions and terminologies around risk, ERM and internal control
- Communicating risk management information to everybody in the organisation

Figure 3.2 The Risk Management Process



Source: Seán & Thierry (2006, 78)

Seán and Thierry (2007) discuss a risk management model which makes the process clear. As illustrated in Figure 3.2 above, proceeding from the top in the centre, the board of directors defines the risk appetite, culture and policy of the company, tries to enhance the risk awareness of all employees, and reviews the risk management procedures developed by management, possibly with outside support. The next step is to determine as accurately as possible, the company's risk profile – its exposure to different types of risks, including a rigorous assessment of the potential impact if certain events materialize. The third step is how risk management takes place – determining how to deal with the risks to which the business is actually exposed. Sometimes, rigorous assessment will disclose risks that the board of directors, or company management, will find unacceptable, and steps will be taken to eliminate these risks or prevent their realisation. It is achieved perhaps by withdrawing from a contract, a project or a country. In other cases, careful assessment will reveal ways to reduce the level of risk, perhaps by reconfiguring a contract or a project, or altering a financial position through portfolio diversification. Having taken these sensible steps, the risks left are central to the business. The choice is to either lay off/transfer the risk by paying a third party such as a financial intermediary to accept a risk that management is unwilling to bear, or accept the residual risk on the company's books and manage it in the ordinary course of business. The potential means to manage the residual risks are through the assistance from external consultants with particular expertise in relevant risk management areas. With these

decisions behind them, management must ensure that it has effective procedures in place to monitor the events giving rise to the risks it has accepted, so that it may have early warning if the risk is changing (increasing or decreasing). Lastly, these observations are communicated rapidly to the officials who can make appropriate decisions about how to deal with the changes. Moreover, the countermeasures for the accepted residual risk in the third step above are as follows:

- Defining risk management strategies
- Identifying institutional collaborators
- Allocating tasks based on relative effectiveness

Proponents of ERM stress that the goal of effective ERM is not to lower risks but to more effectively manage risks on an enterprise-wide basis in order to preserve and improve stakeholder value. ERM requires the board and the management teams to make more comprehensive risk and strategic decisions. As boards and executives focus on the ERM process, they are concerned more about risks influencing the organisation as a whole. This is different from the traditional silo approach (i.e. top-down and bottom-up process) to risk management where management typically assigns risk overseeing responsibilities to business units or individual functions. The outcome of a silo approach is that risks are managed inconsistently or are often based on each manager's personal tolerance for risks. While risks may be managed within an individual business unit to acceptable levels, those risk management activities may unknowingly increase or create risks for other units within the organization. The final result is an increase rather than reduction in net risk for the whole enterprise (Beasley, Branson & Hancock, 2008: 45-46). Therefore, there is a tendency to shift from the bottom-up and top-down process to the transversal process which integrates the enterprise risks and gives a more comprehensive view of the management functions of the whole enterprise. This issue is discussed further in the next section and chapter five.

There are no a priori, universal right answers for how to implement ERM in a given company. There are, however, critical questions each company should ask itself. Successful ERM really does depend on the specific situations of specific companies and their specific histories, cultures and management (Irim, 2008).

Once again ERM itself is a process and the risk management process is developed based on the ERM framework. The next section extends the ERM concept and discusses the corporate governance risk management processes.

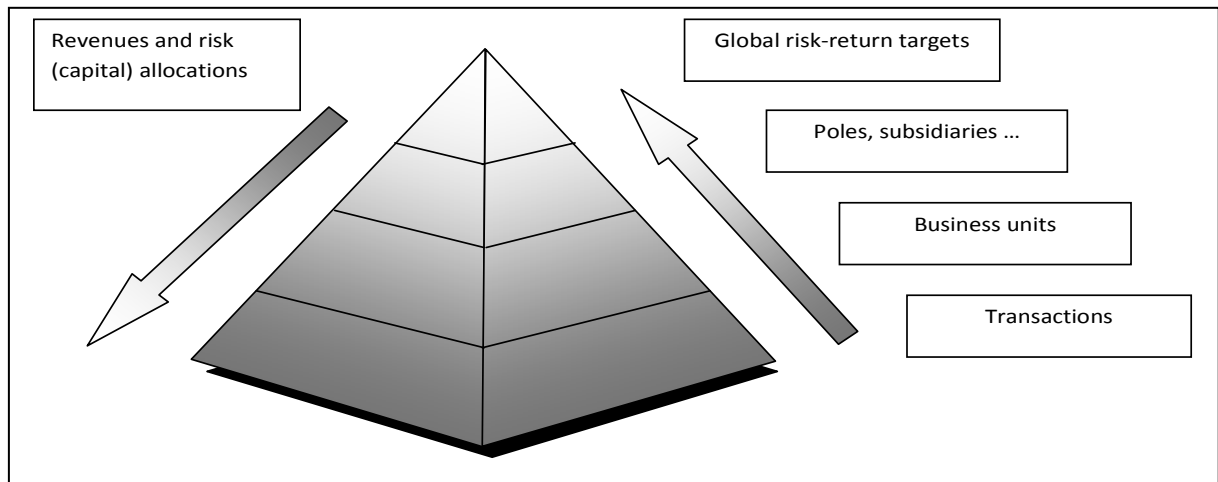
3. THE CORPORATE GOVERNANCE RISK MANAGEMENT PROCESSES

Bessis (2001) states that the risk management process covers all necessary management actions for making decisions and monitoring operations that influence the risk-return profile of transactions, sub-portfolios of business units or the overall bank portfolio. The process extends from the preparation of decisions, to decision-making and control. All procedures and policies required are included to organize this process. Risk management combines top-down and bottom-up processes with horizontal processes. The top-down and bottom-up views relate to the vertical levels of management, from general management to lower divisional management and individual transactions in each department, and vice versa. The horizontal layers refer to the individual transactions, product ranges and market segments, in addition to the overall global level. They require moving back and forth from a risk-return view of the bank to a business view, whose main dimensions are the product families and the market segments.

3.1 Bottom-up and Top-down Processes

As shown in Figure 3.3 below, Bessis (2001) introduces the process which involves the entire banking hierarchy from the top to the bottom, and it turns global targets into signals to business units. From the bottom to the top, risks and profitability are aggregated and monitored. The pyramid image illustrates the risk diversification effect obtained when moving up along the hierarchy. Each face of the pyramid represents a dimension of risk, such as IRR. The overall risk is less than the simple arithmetic addition of all original risks generated by transactions at the base of the pyramid or sub-portfolios of transactions. From bottom to top, risks are diversified. This allows management to take more risks at the transaction level since the risk aggregation diversifies away a large fraction of the sum of all individual transaction risks. Only the post-diversification risks are retained by the bank. These principles will be applied to the risk measurement technique such as VaR concept that will be discussed in chapter five.

Figure 3.3 The Risk Management Pyramid



Source: Bessis (2001, 55)

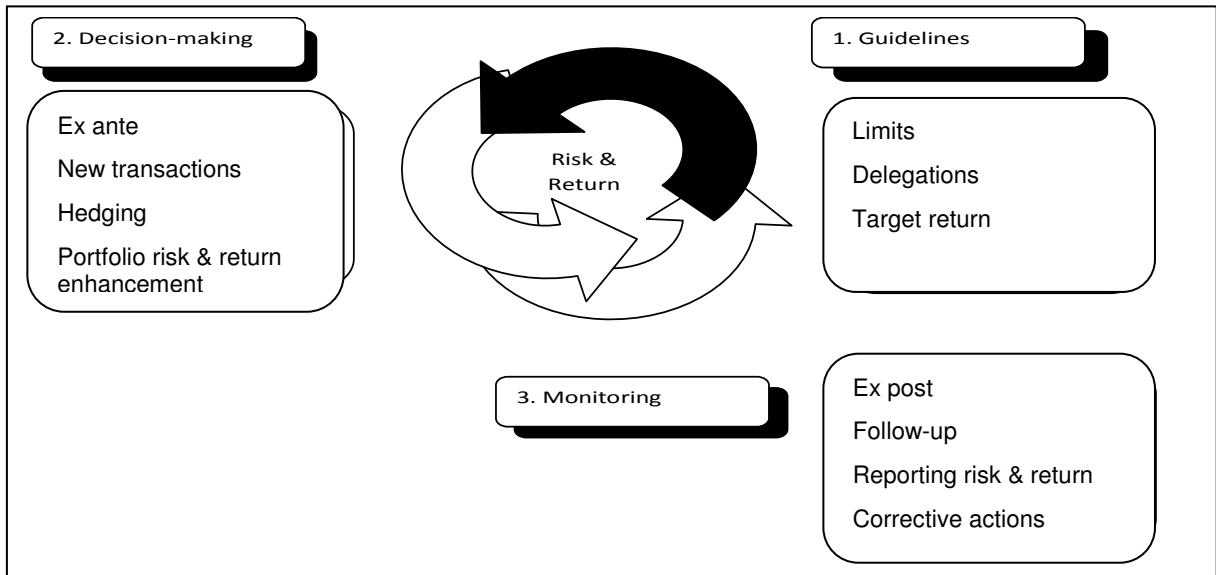
3.2 The Transversal Process

Bessis (2001) argues that the transversal process is a feedback loop process that applies to any horizontal level of the institution, such as business units, product ranges or market segments. As illustrated in Figure 3.4 Panel A below, the typical building blocks of a transversal process are as follows:

- Setting up risk limits, delegations and target returns
- Monitoring the compliance of risk-return profiles of transactions or sub-portfolios with guidelines, reporting and defining corrective actions

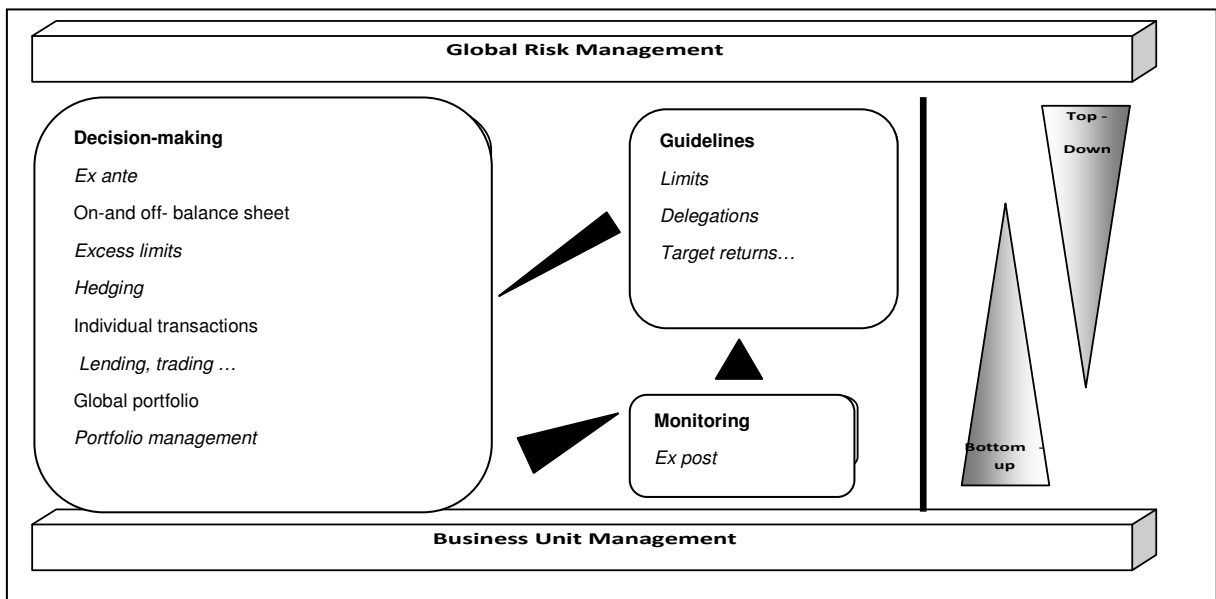
Figure 3.4 The Transversal Process

Panel A The Three-block Transversal Process



Source: Bessis (2001, 56-57)

Panel B The Three Basic Building Blocks of the Risk Management Process



Source: Bessis (2001, 56-57)

3.3 The Transversal Process and Its Elements

In this section, the transversal process is elaborated on with regards to its steps and elements. The two subsections that follow are sourced and adapted from Bessis (2001) for the IRR

management process in the study.

3.3.1 The Transversal Process

Bessis (2001) argues that, as illustrated in Figure 3.4 Panel B above, the transversal risk management process consists of three steps which will be explained in the following parts.

Step one: setting up risk limits and return targets

This step is equivalent to a combination of the risk identification and measurement stages of the risk management process. Risk management guidelines for this step are composed of risk limits and delegations of risk responsibilities to managers, and return benchmarks.

Risk limits and delegations of risk responsibilities to managers

For IRR management, limits set upper bounds to IRR sensitivity and to various market parameters such as the inflation rate and interest rate, while delegations of risk responsibilities to managers serve to decentralize the decision-making process. Specifically, to limit the potential loss of adverse market movements in for instance the inflation rate and interest rate, banks set upper bounds to sensitivities of instruments and portfolios. Sensitivities are changes in portfolio values due to shocks on market parameters, such as the CPIX and Repo rate. To control the IRR of the banking portfolio, limits apply to the sensitivities of the interest rate income or the Net Present Value (NPV) (the mark-to-market valuation of assets minus liabilities) to shocks caused by interest rate changes. By bounding these values, banks limit the adverse movements of these target variables.

It needs to be borne in mind that the rationale for risk limits potentially conflicts with the development of business volume. The risk rationale limits the business volume, because the latter implies the creation of more risks, except when it is possible to hedge risks and avoid any excess exposure over limits. However this is feasible for market transactions and hedging IRR unless the cost of setting up the hedge is too high.

Return benchmarks

Classical profitability measures such as interest income and fees for the banking portfolio, ROE for the bank and individual transactions, and ROA relating income to the size of the exposure are important factors. The P&L is a profitability measure for the trading and banking

books, which is independent of the sales of assets whether it occurs or not. However, only the risk-return profile of the transactions or portfolios is relevant because it is easy to sacrifice or gain the return by altering the risk. Risk-based pricing implies pricing differentiation based on risks, where the risk is defined at the transaction level, the sub-portfolio level as well as at the entire bank portfolio level. Two systems that are prerequisites for this process to work are the capital allocation system, which allocates risks and the funds transfer pricing system, which allocates income. Both capital allocation and transfer pricing systems are unique devices that allow interactions between risk management and business lines in a consistent bank-wide risk management framework. They provide the bottom-up and top-down links between global targets and limits and local business targets and limits.

Step two: decision-making

This step relates decision-making to risk mitigation. The challenge for decision-making is to capture risks upstream in the decision process, rather than downstream, once decisions are made. Helping the business decision process necessitates an ex-ante perspective, plus adequate tools for measuring and pricing risk consistently and accurately. On the one hand, risk decisions include transaction, business unit as well as portfolio decisions. For example, new transactions, portfolio rebalancing and portfolio restructuring through securitizations are risk decisions that refer to the sales of bundled assets into the markets. On the other hand, hedging decisions effectively alter the risk-return profile of the transactions or of the entire portfolio. Therefore, decisions in this context refer to both on-balance sheet business decisions and off-balance sheet hedging decisions. Without a balanced risk-return view, the risk management policy becomes ineffective as it relates to risk reduction, or nullifies the effect of hedging transactions on income.

On-balance sheet actions relate to both new business and the existing portfolio of transactions. With unknown risks, prudence might prevail and prevent risk-taking decisions even though the profitability is in line with the risks. When transaction volume is the priority, controlling risks might become a second-level priority unless risks become more material. In both cases, risk models provide information for taking known and calculated risks. Traditionally, periodical corrective actions, such as managing non-performing loans and providing incentives to existing customers to take advantage of new services, help to improve the risk-return profile. Alternatively, portfolio management measures such as securitization,

syndications, loan trading and risk hedging are often employed. In comparison, off-balance sheet actions refer mainly to hedging transactions. ALM is in charge of controlling the liquidity and IRRs of the banking portfolio and is responsible for the hedging programs.

Step three: risk-return monitoring

The monitoring and periodical review of risks is a standard part of any controlling system. The monitoring results are followed by the corrective actions or confirmations of existing PPS. Periodical reviews of risk serve to assess any significant event that might change the policy of the bank with respect to some counterparties, industries or countries.

Monitoring systems include early warning systems such as special reviews by putting borrowers into a watch list. A prerequisite for risk-return monitoring is to have measures of risk and return at all relevant levels, that is, at global business units and transactions levels. One significant element of the monitoring systems is to implement risk-based performance tools. These compare ex-post revenues with the current risks or define ex-ante which pricing would be in line with the overall target profitability, given the risks. The standard tools for risk-adjusted performance, as well as risk-based pricing, are the RaRoC and SVA measures.

3.3.2 Four Main Elements of the Transversal Management Process

The four general elements in the process are namely risk identification, risk measurement, risk mitigation and risk monitoring and reporting. Due to the different nature, complexity and risk inherent in the banking activities – for example, different strategic business focus, portfolio structure and risk profile – banks are exposed to different risk categories, in other words, the relative contribution of each risk type to the total risk capital varies from bank to bank. Therefore the effective and efficient identification and prioritization forms the first step of the management model process. The banking risk appetite and tolerance (aversion, preference or neutrality) are in turn built up, which will be used together with the VaR figure in determining the risk limit.

The second step is risk measurement. With regards to the banking book IRR management, the balance sheet assets and liabilities are generally sensitive to the interest rate fluctuations in the economy, the P&L incurred are measured and the risk limit is determined for later model performance monitoring. The risk limits are usually calculated as a VaR amount or EaR

amount or both. If future actual portfolio losses consistently exceed the VaR and/or EaR risk limit set in advance, then the VaR and/or EaR model needs to be stress-tested and back-tested regularly. VaR and EaR limit exceeding may happen on a monthly and daily basis respectively. The feedback is usually obtained through the monitoring stage.

The third stage is related to risk mitigation. Specifically, among the financial derivatives, the most common tools used currently for risk hedging in the banking sector are swaps, FRA's, interest rate caps, interest rate floors, interest rate futures and swaptions (option on a swap). According to the 2005 annual report of the Bank Supervision Department of the SARB, the forward contracts contributed to the largest portion of total turnover in derivative instruments (SARB, 2006). This stage aims at reducing the current portfolio risks to a level below the risk limits set during the risk measurement stage. It is one of the corrective measures taken to reduce the exposure to the desired level if losses regularly overshoot VaR risk limits detected in stage two above.

The other corrective method is employed as the last stage of the risk management process, that is, risk monitoring and reporting. The monitoring activity also takes place between stage two and three when back-testing whether VaR exceeds the set-limits. If the VaR limits are exceeded over a predefined confident interval range, the result is looped back bottom-up to the first stage and will force the model to be re-evaluated in terms of the risk profile. The option is either to reset to a higher risk limit, to hedge the risks, or to increase the risk capital level. Moreover, the model performance should be regularly reported to the higher levels of risk management, daily to the ALM unit, monthly to group ALM and quarterly to the group risk management committee and annually to the board of directors of the bank. The monitoring and reporting stage is discussed further in the sections on risk governance and internal control later on in this chapter.

The risk management process is subject to the corporate and risk governance principles in order to ensure an effective risk management process performance and to fulfil the risk management objectives. This issue is discussed in the next section.

4. CORPORATE AND RISK GOVERNANCE

In this section, the corporate and risk governance definitions as well as sound governance principles are discussed. In a nutshell, since the output generated from each key step of the

risk management process is communicated as an input to the next step, corporate governance principles should ensure that the risk management process performs effectively.

4.1 Corporate Governance

Corporate governance is the system of internal controls and procedures by which individual companies are managed. It provides a framework that defines the rights, roles and responsibilities of different groups – management, board, controlling shareholders and minority or non-controlling shareholders – within an organization. This system is particularly important for companies with a large number of widely dispersed minority shareholders (CFA Institute, 2005).

Recently there have been considerable interests in the corporate governance practices of modern corporations, particularly since the high-profile bankruptcy filings of a number of large USA firms such as Enron Corporation, Worldcom, and banking institutions such as Lehman Brothers, Merrill Lynch, Bear Stearns and Washington Mutual Bank. Increasingly, board members and those with a responsibility for corporate governance are using the services of external providers to conduct anti-corruption auditing, due diligence and training activities.

4.2 Risk Governance

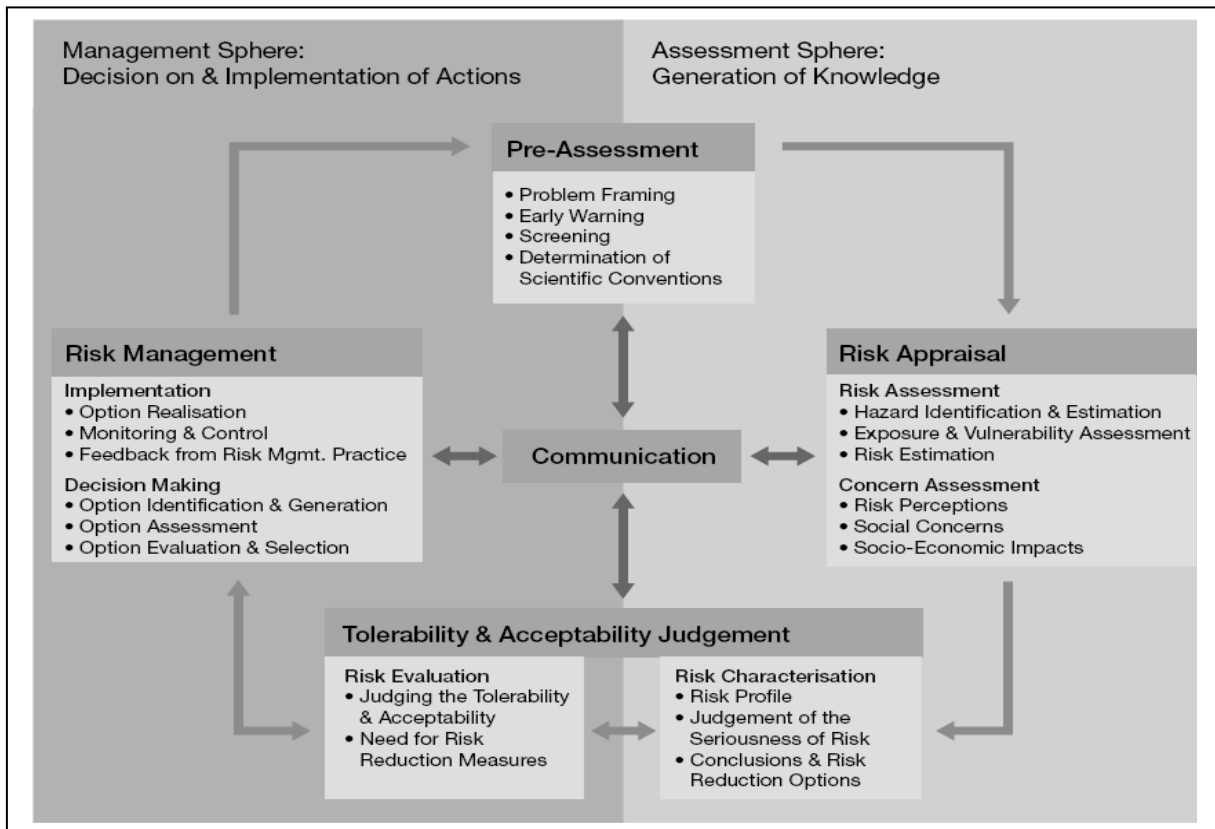
Risk governance includes the totality of people, rules, conventions, processes, and mechanisms concerned with how relevant risk information is collected, analysed and communicated and how management decisions are made. Encompassing the combined risk-relevant decisions and actions of both governmental and private sectors, risk governance is of particular importance in, but not restricted to, situations where there is no single authority to take a binding risk management decision but where instead the nature of the risk requires the collaboration and co-ordination among a range of different stakeholders. Risk governance, however, not only includes a multifaceted, multifactor risk process. It also calls for the consideration of contextual factors such as institutional arrangements (e.g. the regulatory and legal framework that determines the relationship, roles and responsibilities of the people and co-ordination mechanisms such as markets, incentives or self-imposed norms) and political culture including different perceptions of risks (Renn & Graham, 2005).

Figure 3.5 below shows an example of a risk governance framework developed by the

SIRR Management Process of Commercial Banking

International Risk Governance Council (IRGC). The framework consists of four interconnected components which are pre-assessment, risk appraisal, tolerability and acceptability judgement and risk management. The development of a bank-wide risk management organization is an ongoing process. The traditional commercial bank organization tends to be divided into financial sphere and business sphere. The business lines tend to develop volume, sometimes with an increasing probability of risk occurrences and in turn lower profitability, while the financial sphere tends to focus on profitability, with dedicated credit and market risk monitoring units. This dual view is gradually replaced with the emergence of new dedicated functions implemented bank wide.

Figure 3.5 IRGC Risk Governance Framework



Source: Renn & Graham (2005, 13)

The modern risk management organization separates risk management units from business units. Bank-wide risk management has promoted the centralization of risk management and led to a clean break between risk-taking business units and risk-supervising units since these need to take more risks to achieve their profitability. Specifically, the banking portfolio generates IRR created by business units that may have no control over interest rate

movements. The IRR is then transferred to the ALM unit that is responsible for the distinction between risks and risk measures (Bessis, 2001).

Good corporate governance should provide proper incentives for the board and management to pursue objectives that are in the interests of the company and its shareholders. The presence of an effective corporate governance system facilitates the effective monitoring within an individual company and across an economy as a whole, and helps to provide a degree of confidence that is necessary for the proper functioning of a market economy.

From the perspective of the banking industry, corporate governance involves the manner in which the businesses of banks are governed by their boards of directors and senior management, in terms of

- setting corporate objectives,
- operating the bank's business on a daily basis,
- meeting the obligation of accountability to their shareholders and taking into account the interests of other recognised stakeholders,
- aligning corporate activities and behaviour with the expectation that banks will operate in a safe, sound manner and in compliance with applicable laws and regulations, and
- protecting the interests of depositors and permitting the supervisor to place more reliance on the bank's internal processes.

Corporate governance arrangements, as well as legal and regulatory systems, vary widely between countries. Nevertheless, sound governance can be achieved regardless of the form used by a banking organisation as long as several essential functions are in place. There are four important forms of overseeing that the organisational structure of any bank should cater for in order to ensure appropriate checks and balances, namely, (1) overseeing by the board of directors; (2) overseeing by individual persons not involved in the daily activities of the various business areas; (3) direct supervision of different business areas; and (4) independent risk management, compliance and audit functions. In addition, it is important that key personnel are fit and proper for their jobs.

4.3 Sound Corporate Governance Principles of the Basel Committee on Bank Supervision

The following principles are a summary of the relevant sections from the paper “Enhancing corporate governance for banking organisations” issued by the Basel Committee on Banking Supervision. The principles define the board and senior management roles and responsibilities in monitoring and controlling the risk management framework and process to ensure effective performance.

- The board of directors should be composed of qualified members who clearly understand the functioning principles of corporate governance and are able to make their decisions based on sound judgements. In particular, it is an important issue when the board is dominated by senior management and impacted on by political forces. In other words, the board of directors should be independently making decisions in accordance with their responsibilities and be composed of a majority of members who are independent and have a sufficient knowledge of banking businesses and risk management. In addition, on-going training should be provided for those members who lack the knowledge of banking, finance as well as risk management.
- The board of directors is responsible for the policy and guideline approval and framework performance monitoring in order to ensure that the strategic objectives are followed and corporate values are retained throughout the bank. Conflicts of interest may arise within the bank as well as between banks, so the board of directors should instruct senior management to develop PPS to identify and avoid or manage those potential conflicts of interest. In the case that the bank is both owned and supervised by the banking supervision authority of the country, the management function should be separated from the supervision function.
- The board of directors is in the position to formulate and enforce responsibilities and accountabilities for all the business units of the bank. Particularly, senior management is delegated by the board and in turn senior management delegates the duties to their staff respectively within their functional management areas and/or business units. The senior management activities are overseen by the board.

SIRR Management Process of Commercial Banking

- The board of directors should oversee and ensure that the senior management delegation and other management activities are in line with the board's PPS. Senior management should be comprised of the core individuals such as Chief Financial Officer (CFO) and divisional heads. They should possess the appropriate skills to enable them to monitor and control the key individuals such as product managers within their management functional areas and business units.
- The internal and external audit functions as well as internal control functions should facilitate the board and senior management through producing periodical audit and control reports especially in the legal and compliance areas. These reports should provide the board and senior management an independent overview on the performance results received from lower management level such as the product managers of the bank.
- The board of directors should ensure that the compensation policies of board members, senior management and other management within the bank align with the bank's culture and long-term business objectives. The remuneration policies should be handled by a unit composed of a majority of independent directors so as to deal with conflicts of interest and protect stakeholders' value.
- The bank should be overseen in a way which makes the bank transparent in terms of public information disclosure. In other words, the board should ensure that stakeholders obtain sufficient public information such as ownership structure and business objectives of the bank through annual risk reports.
- The board and senior management should take measures to reduce the effects caused by those operational structures that lower the transparency of the bank. The possible actions could for example require internal control functions to incorporate those activities that lack the transparency. The board and senior management should ensure an effective risk management process to identify, measure, and control all material risks from such activities.

Basel II regulation in the next section supplements the ERM and process development in terms of setting specific criteria for the key steps and elements within the framework and process.

5. BASEL II (JUNE 2006)

A significant innovation of the revised framework is the greater use of risk assessments provided by the banks' internal systems as inputs to capital calculations. By taking this step, the Basel committee on banking supervision puts forward a detailed set of minimum requirements designed to ensure the integrity of these internal risk assessments. It is not the committee's intention to dictate the form or operational detail of the banks' risk management policies and practices. Rather, each supervisor will develop a set of review procedures to ensure that the banks' systems and controls are adequate to serve as the basis for the capital calculations. Supervisors will need to exercise sound judgements when determining a bank's state of readiness, particularly during the implementation of the process. The committee expects that national supervisors will focus on compliance with the minimum requirements as a means of ensuring the overall integrity of a bank's ability to provide prudential inputs to the capital calculations and not as an end in itself (Basel II, 2006). In this section, the relevant criteria regarding the risk management framework process/internal model and their elements are extracted and summarised from the Basel II Accord. The relevant Basel II principles are also referred to in the following chapters of the study.

It is important that supervisory authorities are able to assure themselves that banks are using models having market risk management systems that are conceptually sound and implemented with integrity. Accordingly, the supervisory authority will specify a number of qualitative criteria that banks would have to meet before they are permitted to use a model-based approach. The extent to which banks meet the qualitative criteria may influence the level at which supervisory authorities will set the multiplication factor for VaR since only those banks whose models are in full compliance with the qualitative criteria are eligible for application of the minimum multiplication factor.

In the context of the South African banking sector, during 2006 the department of bank supervision of the SARB conducted in-depth reviews on banks following the Internal Model Approach (IMA) to calculate the capital requirement for market risk. These reviews were part of the process of annual IMA approval and re-assessment of the VaR multiplication factor (SARB, 2007a).

The following is a summary of the qualitative criteria as set out in Basel II for evaluating the

banking risk management process.

- The bank should establish an independent risk control unit which designs and implements the risk management system of the bank. For instance, the unit should generate the periodical reports on the outputs of the risk measurement model such as VaR. This unit should be separated from the business units and report directly to the senior management of the bank.
- The risk control should conduct a periodical back-testing procedure on both ex-post and ex-ante bases. The unit should conduct an on-going internal model validation process as well.
- The board of directors and senior management should actively participate in the risk control process. The risk control process should be treated as an essential area of the business with adequate support resources available. The periodical reports of the risk control unit should be reviewed by a management level that possesses sufficient authority in order to reduce the bank's overall risk exposure.
- The risk measurement model should be integrated into the daily risk management process of the bank and it provides outputs for the monitoring and controlling stages of the process.
- The risk limits are set according to the outputs from the measurement model. The limits should be consistent with measurement model results over time and be well-understood by the senior management.
- A rigorous stress-testing procedure should be conducted to supplement the risk analysis and improve accuracy of risk measurement techniques such as VaR. The stress-testing results should be reviewed by senior management and reflected in the capital adequacy assessment report, risk management policy and in turn risk limits setting/adjustment program. Prompt steps should be taken to manage those risk events that the bank is most vulnerable to through for instance hedging against that outcome, reducing the size of the bank's exposure or increasing capital.

- The bank's risk measurement model should be well-documented through for example a risk management manual. The document should contain internal policies, controls and operational procedures related to the risk measurement model.
- A regular overview of the risk measurement model should be conducted through an internal auditing process of the bank. The review should consist of both the business units and risk control unit activities. The review of the whole risk management process should also be conducted at least once a year and should address the critical aspects such as the verification of the model's accuracy through frequent back-testing, the adequacy of documentation of risk management process, and the organisation of a risk control unit.

Having discussed issues such as ERM, the risk management process and their relevant policies and guidelines, the next section is devoted to furthering the secondary research of the study through reviewing the annual risk reports of the four major banks in South Africa.

SUMMARY AND CONCLUSION

This chapter provides an overview of the ERM framework and gives some basis and understanding of the framework within which the SIRR process should function. The concepts and rationale of ERM, the risk management process and in particular the transversal process as well as corporate/risk governance principles are explained. The fundamental principles discussed in this chapter are extracts and adaptations from the ruling regulations and papers such as Basel II, "Enhancing corporate governance for banking organisations" and "Principles and Supervision of IRR" issued by the Basel Committee on Banking Supervision, and other principles and guidelines from the International Risk Governance Council. These principles are consolidated in order to put forward an ERM framework construction for managing SIRR.

Currently ERM does not make a distinction between SIRR management as a system separate from the IRR management system or even that two such systems should exist. However, this chapter shed some light on the ERM concept and described the framework within which the SIRR, as with IRR could possibly be housed within a bank. No or little past research deals specifically with SIRR management as such. The next chapter may illuminate this issue

further.

This chapter also dealt with corporate governance principles in the ERM framework. In particular, through clearly defining and timely communicating governance policies and procedures at all management levels of the bank, the effective corporate and risk governances and internal control functions may lead to an effective monitoring and controlling of the SIRR management process. At least, effective corporate governance and ERM implementation should avoid the monetary loss caused by unexpected risk events and minimize the total monetary loss that could put the bank in danger as a going-concern. Corporate governance principles facilitate the risk management process through facilitating or requiring the effectiveness and accuracy of the output from each stage of the process. In the end, the effectiveness and accuracy of the outcome produced through the process (i.e. monitoring and reporting stage) shall be maximized.

The next chapter focuses on the tendencies in bank risk management in South Africa and globally.

CHAPTER FOUR: TENDENCIES OF BANK RISK MANAGEMENT IN SOUTH AFRICA AND GLOBALLY

1. INTRODUCTION

In this chapter, an attempt is made to understand current South African and global bank risk management tendencies as it relates to ERM and SIRR. The financial statements of selected South African banks are examined to illustrate these tendencies. By reviewing annual reports of major international banks, the ways in which risks are managed by these international banks are compared to the methods used by South African banks.

The current turmoil in the financial market is caused by the USA subprime crisis. This necessitates changes that need to be put into place in the global banking sector, particularly within bank risk management. Recent market developments are not yet taken into account by risk management techniques and strategies of banks. An empirical survey done by PWC gathered primary data from South African banks which has shed light on the changes in bank risk management.

This chapter discusses the current status of bank risk management in South Africa and in other major global banks. Section two presents an overview of the risk management system in South African banks and elaborates on the IRR management system of small and medium-sized banks (SMBs) and the major four banks in South Africa. Section three reviews risk management in major global banks.

2. RISK MANAGEMENT IN THE SOUTH AFRICAN BANKS

Although small by global standards, South Africa has the largest and most sophisticated financial market in Africa. The banking sector has well-established credit and management information systems. However the banking sector in South Africa is also highly concentrated. In South Africa, the four largest banks have approximately eighty nine per cent of retail

deposits (Okeahalam, 2001: 15-16). This is high by international standards. The four major banks also have financial resources to implement the best risk management systems. Subsequently these banks are the focus of this chapter.

As shown in Figure 4.1, at the end of June 2008 the size and broad structure of the banking sector was unchanged from the previous year with thirty five registered banks in South Africa and forty six representative offices of foreign banks. The four major banking groups (Standard Bank, ABSA, FirstRand Group and Nedbank) and their control of eighty four per cent of the total sector assets have remained in a dominant position since 2005 (SARB, 2007: 55).

Figure 4.1 Size of the South African Private Banking Sector

Size of the South African Private Banking Sector				
	June 2007		June 2008	
	Number of institutions	Total assets (Rand billion)	Number of institutions	Total assets (Rand billion)
Locally controlled banks	14	2 126	14	2 715
Foreign controlled banks	5	9	5	10
Mutual banks	2	1	2	1
South African branches of foreign branches	14	173	14	227
Total registered banks	35	2 309	35	2 953

Source: SARB (2008, 55)

The number of local SMBs increased steadily during the 1990s. In late 1999, these banks faced liquidity pressures and they exited from the banking sector. This downward trend continued with the placement of Saambou Bank into curatorship in February 2002 and the subsequent integration of BOE Bank into Nedbank. From the last quarter of 1999 to the end of March 2003, there were approximately twenty two banks that exited the South African banking sector. However, this was mainly due to a consolidation of the broader banking sector than a failure of the SMB sector. In 2008 small local banks constituted 3.1 per cent of the total banking sector assets in comparison to 21.7 per cent in 1994 (Mboweni, 2004: 1).

The 2007 financial crisis has resulted in the consolidation of the USA banking sector due to banks' inadequate capital reserves. Sasfin Bank (2008) stated that much of the consumer

spending in the USA was financed by liberal subprime housing loans and aggressive securitisation structures. This is based on an expectation of future house price increases. When interest rates were increased, these structures were not sustainable and resulted in losses. The financial losses are estimated to exceed one trillion USA dollars. The USA banking industry found it difficult to compensate these losses with new capital. A consequent erosion of Tier I capital resulted in the withdrawal of loans and the disposal of assets on a massive scale in order to meet stringent capital adequacy requirements. The resultant global credit crunch widened spreads on world capital and money markets.

Fortunately, South African banks do not have significant exposure to the subprime mortgage loan securitisation structures mentioned above. South African banks are well-capitalised and they are in far better shape than many of their international counterparts and this has given them a competitive advantage. The advantage is made obvious because many foreign banks are being forced to sell assets on a huge scale in order to restore their capital adequacy ratios. The significant investment over the past few years by two major international banking groups (Barclays Bank in the UK and Industrial and Commercial Bank of China) in the South African banking industry is testament to the international standing of South African banks.

Banking has become extremely sophisticated. Banking activities involve complex structures such as securitisation, private equity, hedge funds and derivatives. The upgrading of the Basel Capital Accords goes a long way towards identifying risks inherent in sophisticated banking activities and specifying the right levels of capital to absorb losses.

The inflation target range of three to six per cent has been exceeded since March 2007 although there have been many contributing factors. Sasfin Bank (2008) stated that South Africa experiences an increasing level of the infrastructural investments which are financed in part by significant price hikes for goods and services, for example electricity. The potential political instability and large current account deficit arising mainly from excessive consumer spending on imported goods, escalating fuel prices and infrastructural expenditure have caused the Rand to depreciate against major currencies since 2008. The increasing cost of resources (especially food and oil) puts upward pressure on inflation and low income workers demanding higher wages (through the intervention of trade unions) exacerbates inflation. Subsequently, the inflation rate has been far in excess of the reserve bank's target range of three to six per cent.

2.1 The South African Banks

To date there are thirty five locally registered banks in South Africa as shown in Table 4.1.

Table 4.1 Thirty Five Banks and Branches Ranked by Asset Size in South Africa, 2008

1. Standard Bank Group Limited (Standard Bank)
2. ABSA Group Limited (ABSA)
3. FirstRand Group Limited (FirstRand Group)
4. Nedbank Group Limited (Nedbank)
5. Investec Limited (Investec)
6. Citibank N.A
7. JP Morgan Chase Bank Johannesburg Branch
8. Imperial Bank (part of Nedbank)
9. Calyon Corporate and Investment Bank
10. Deutsche Bank AG
11. ABN AMRO Bank
12. African Bank Investments Limited
13. HSBC Bank plc Johannesburg Branch
14. Commerzbank
15. Societe Generale Johannesburg Branch
16. Standard Figureered Bank
17. Mercantile Bank Holdings Limited
18. TEBA Bank Limited
19. Capitec Bank Limited
20. Regal Treasury Private Bank (in liquidation)
21. China Construction Bank Corporation Johannesburg Branch
22. Albaraka Bank
23. Sasfin Bank Limited
24. HBZ Bank
25. MEEG Bank Limited (associate of ABSA)
26. Grindrod Bank Limited (formerly part of Marriott Corporate Property Bank Limited)
27. The South African Bank of Athens
28. State Bank of India
29. GBS Mutual Bank
30. Bank of Taiwan South Africa Branch
31. Bidvest Bank Limited (former Rennies bank)
32. Habib Overseas Bank
33. Bank of China Johannesburg Branch
34. VBS Mutual Bank
35. Bank of Baroda

Source: PWC (2006, 141)

There are approximately ten domestic SMBs in South Africa namely: Investec, TEBA Bank, Capitec Bank, Sasfin Bank, African Bank, Marriott Bank, GBS Mutual Bank, Bidvest Bank, VBS Mutual Bank and Mercantile Bank as shown in Table 4.2 (PWC, 2006: 141).

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Table 4.2 Ten Small to Medium Local Banks in South Africa, 2008

1. Investec Limited (Investec)
2. African Bank Investments Limited (African Bank)
3. TEBA Bank Limited (TEBA Bank)
4. Capitec Bank Holdings Limited (Capitec Bank)
5. Sasfin Bank Limited (Sasfin Bank)
6. Grindrod Bank Limited (GrindrodBank)
7. GBS Mutual Bank
8. Bidvest Bank Limited (Bidvest Bank)
9. VBS Mutual Bank
10. Mercantile Bank Holdings Limited (Mercantile Bank)

Source: PWC (2006, 141)

The trading and non-trading IRR management processes of seven SMBs in South Africa (Investec, African Bank, Capitec Bank, Sasfin Bank, GBS Mutual Bank, Bidvest Bank and Mercantile Bank) are thoroughly reviewed by examining the latest (2007/2008) annual reports of each bank. Risk management systems may vary from bank to bank depending on an individual bank's balance sheet structure as well as its business strategy. Table 4.3 provides a snapshot of the balance sheet structure of all South African banks.

Table 4.3 Quarterly DI-900 Analysis of Individual South African Banks, March 2007

Quarterly DI-900 Analysis of Individual South African Banks - March 2007

Line Number	Bank	Capital & Reserves	Total Assets	Contingent Liabilities	Total Public Liabilities	Deposits				Acceptances	Repurchase Agreements	Resale Agreements
						Total	Short	Medium	Long			
		Rand Million	Rand Million	Rand Million	Rand Million	Rand Million	%	%	%	Rand Million	Rand Million	Rand Million
1	ABSA Group	38 790	470 240	105 200	408 405	371 857	58.7	21.5	19.8	208	14 505	10 331
2	First Rand Group	30 054	404 492	131 858	320 834	290 320	64.3	17.7	18.0	320	14 552	10 542
3	Investec Bank	11 316	128 223	16 515	107 041	103 399	50.6	28.6	20.8	0	2 148	2 343
4	Nedbank	29 891	390 880	93 328	331 734	307 715	62.9	21.0	16.1	0	7 547	8 874
5	Imperial Bank	3 258	32 301	795	28 583	28 583	2.2	0.1	97.7	0	0	0
6	Nedbank Group	33 149	423 031	94 120	360 317	336 299	57.7	19.2	23.0	0	7 547	8 674
7	The Standard Bank of SA	35 365	549 818	272 029	432 089	371 326	66.1	13.8	20.0	0	14 664	6 058
8	ABN Smro Bank	1 732	18 734	6 665	17 191	17 191	74.9	24.6	0.5	0	0	150
9	African Bank	1 925	9 390	488	6 743	3 038	17.5	20.7	61.8	0	0	0
10	Abaraka Bank	159	1 487	107	1 291	1 291	46.0	24.3	29.7	0	0	0
11	Bank of Baroda	93	266	163	173	135	84.7	9.9	5.5	0	0	0
12	Bank of China	66	446	87	349	275	86.2	13.8	0.0	0	0	0
13	Bank of Taiwan SA Branch	110	366	562	228	208	93.9	6.1	0.0	0	0	0
14	Barclays Bank PLC	0	0	0	0	0	n/a	n/a	n/a	0	0	0
15	Capitec Bank	978	2 255	899	919	902	65.2	0.2	34.6	0	0	0
16	China Construction Bank	163	1 325	403	1 144	1 144	78.8	20.8	0.4	0	0	0
17	Citibank NA	2 551	45 126	3 768	35 153	34 708	78.8	17.3	3.9	0	434	3 516
18	Commerzbank	1 790	7 860	3 172	6 900	5 714	70.3	24.5	5.1	1	0	0
19	Credit Agricole Indosuez	853	23 263	2 303	20 158	18 830	74.0	12.9	11.1	0	0	0
20	Deutsche Bank	268	25 138	813	23 993	17 104	36.1	49.9	14.0	0	6 889	6 890
21	GBS Mutual Bank	62	616	83	519	519	27.3	20.8	51.9	0	0	0
22	Habib Overseas Bank	31	419	272	412	389	97.3	2.0	0.7	0	0	0
23	IBZ Bank	86	1 218	712	1 088	1 088	94.2	0.9	2.0	0	0	0
24	IBBC Bank	552	10 853	3 028	9 501	9 000	91.8	8.2	0.0	0	0	150
25	ING Bank	0	0	0	0	0	n/c	n/c	n/c	0	0	0
26	JP Mogan Chase Bank	4 159	23 822	748	19 448	12 200	92.5	5.0	2.5	0	7 248	5 589
27	Marriott Merchant Bank	250	968	137	703	703	84.0	15.1	1.0	0	0	0
28	Meeg Bank	73	1 072	102	972	950	69.0	21.7	9.3	0	0	0
29	Merchantile Lisbon Bank	417	4 244	992	3 371	3 280	58.5	32.9	8.6	0	0	0
30	Regal Treasury Private Bank	450	1 522	21	1 096	1 093	53.9	11.5	34.6	0	0	0
31	Hennies Bank	316	579	79	160	135	76.2	15.0	8.7	0	0	0
32	Sasfin Bank	327	1 190	84	785	721	94.8	2.6	2.6	0	0	0
33	Societe General JHB Branch	243	4 417	373	4 106	4 106	79.1	20.7	0.1	0	0	0
34	Standard Chartered Bank	351	4 967	80	4 413	4 413	82.3	8.8	9.0	0	0	0
35	State Bank of India	86	635	904	500	500	45.6	51.7	2.7	0	0	0
36	Teaba Bank	472	2 429	25	1 837	1 837	87.3	9.6	3.1	0	0	0
37	The SA Bank of Athens	88	913	234	781	719	59.6	37.5	2.9	0	0	0
38	VBS Mutual Bank	21	229	7	208	205	52.3	26.4	21.3	0	0	0
39	TOTAL	167 658	2 177 180	707 107	1 792 827	1 615 405	61.9	19	19.2	529	67 987	86 242
40	Totals(R1= 0.1382) US \$ m	23 169	300 869	97 717	247 755	223 236				73	9 396	9 154
41	Totals(R1= 0.0740) £ m	11 800	153 231	49 766	126 180	113 693				37	4 785	4 662
42	Totals(R1= 0.0741) ¥ m	2 726	85 397	11 496	29 148	26 264				9	1 106	1 077
43	Totals(R1= 0.0742) € m	17 358	225 404	73 207	185 612	167 244				55	7 039	6 858

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Note: Bank refers a bank registered under South Africa law, DI900 is the statutory return submitted monthly to the South African Reserve Bank by each registered bank

Source: PWC (2007, 80)

According to the PRMIA ERM survey in 2008, the ERM framework among major global banks (on which the risk management process is based) is either related to the COSO risk management model or other internationally recognised models such as the standardised approach of the Basel II Accord. Major global banks implement IRR management processes that comprise the key steps of risk identification, risk measurement, risk mitigation and risk monitoring and reporting.

Banks in South Africa follow a similar risk management approach to the major global banks. Depending on the balance sheet structure and business strategy of the individual bank, the stages of the risk management process may vary from bank to bank. For instance the risk mitigation stage may only form a minor part of the risk management process due to the lack of trading activities. Furthermore risks are mitigated through portfolio diversification.

According to banks' annual reports in general, South African SMBs and the four major banks comply with international risk management regulations such as Basel II and "Principles for management and supervision of interest rate risk". The bank management implements the governance procedures approved by the board of directors for the risk management process which is overseen by the board of directors. Generally risks are controlled through the business unit, the risk management unit and the internal audit function. The risk management process of SMBs consists of four key steps: risk identification, risk measurement, risk mitigation and risk monitoring and reporting.

Specifically, risk identification methods are generally not disclosed in most banks' annual reports while some SMBs rank top risk exposures through risk scoring. The major risk types are defined and explained in the annual reports. Trading market risks are measured through VaR, ETL and sensitivity analysis. For non-trading market risk, the repricing GAP and its sensitivity analyses and the stress testing method are often used. Risk hedging instruments include futures, options, swaps and FRA's. Swap and forward contracts are mostly used to hedge IRR. Trading and non-trading market risks are monitored through setting risk limits and controlling the risk exceeding the limit and/or general risk governance principles.

The study focuses on the four major banks in South Africa as their asset values account for

more than eighty per cent of the South African banking sector. In the next section the issues of risk management frameworks, governance, and processes are discussed by analysing the annual reports of the four major banks.

2.2 The IRR Management Systems of Four Major South African Banks

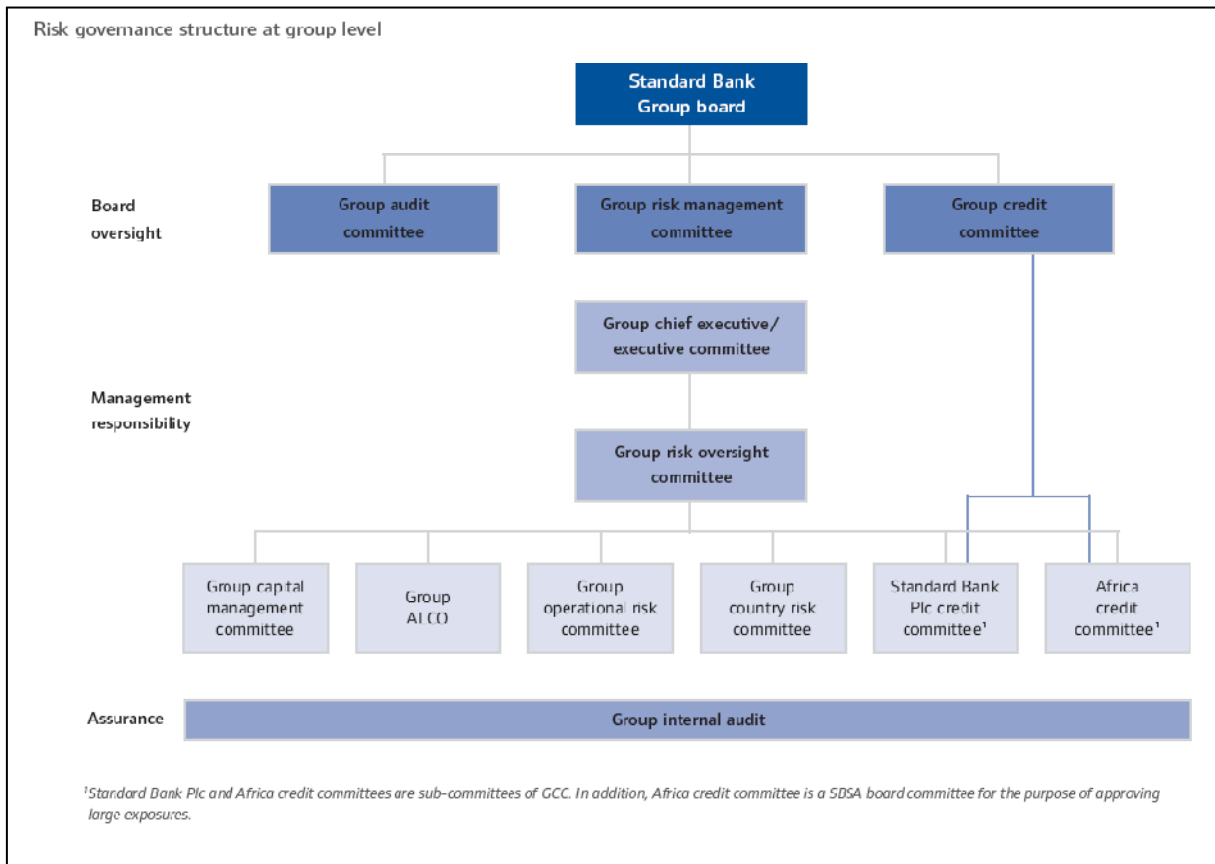
According to the risk managers of the four largest banks (Standard Bank, ABSA, FirstRand Group and Nedbank) in South Africa, there is not a general framework process being implemented for banking book SIRR management. In general, the current risk management approach adopted by these banks comprises of four key elements: risk identification, measurement, mitigation and monitoring and reporting. However, these elements are rather separate from each other and not linked in a process. The following section contains information that is extracted and summarised based on the annual risk reports of the major commercial banks in South Africa.

2.2.1 Standard Bank

Standard Bank adopts an approach to risk management that is based on a well-established governance process. The bank manages risks through risk responsibility delegation and collective overseeing which is supported by the comprehensive reporting system. This approach balances strong corporate overseeing at the bank level with independent risk management structures within each business unit. The bank completed the implementation of governance standards for all major risk types. All standards are applied consistently across the bank and are approved by the board through either the Bank Risk Management Committee (BRMC) or Bank Credit Committee (BCC). Standard Bank follows the ERM framework that is aligned with the COSO risk management model. Consequently the ALM risk management approach is developed based on the ERM framework.

As illustrated in Figure 4.2 below, the bank's governance structure reflects the expectations and requirements of the board of directors with regards to the key areas of control across the bank. There are three levels of risk management responsibilities in the governance structure: the board of directors, senior management and the internal audit. The risk governance structure ensures alignment and consistency in the risk management process. Through the risk management process, major risk types across the bank are identified, measured, controlled, monitored and reported.

Figure 4.2 Risk Governance Structure at Group Level



Source: Standard Bank (2006, 49)

The board of directors reviews the risk profile that is in line with the bank’s growth strategy. The bank management is required to maintain an appropriate internal control system to ensure that risks are managed within agreed risk limits. The board of directors delegate risk responsibilities to three committees – a risk management committee, an audit committee and a credit committee. These committees receive regular and comprehensive risk reports from the bank management. The key outcomes of all three committees is that the director of the bank risk is responsible for setting a framework that will ensure effective risk management for all risk types (excluding credit and country risk) across the bank. The outcomes of the three committees are reported to the board of directors on a quarterly basis. The head of each business unit is responsible for the management of risks within each business unit.

The internal audit independently audits the adequacy and effectiveness of the bank’s risk management, control and governance functions. The director of the bank’s internal audit reports to the bank audit committee. Furthermore there is bank compliance which is an

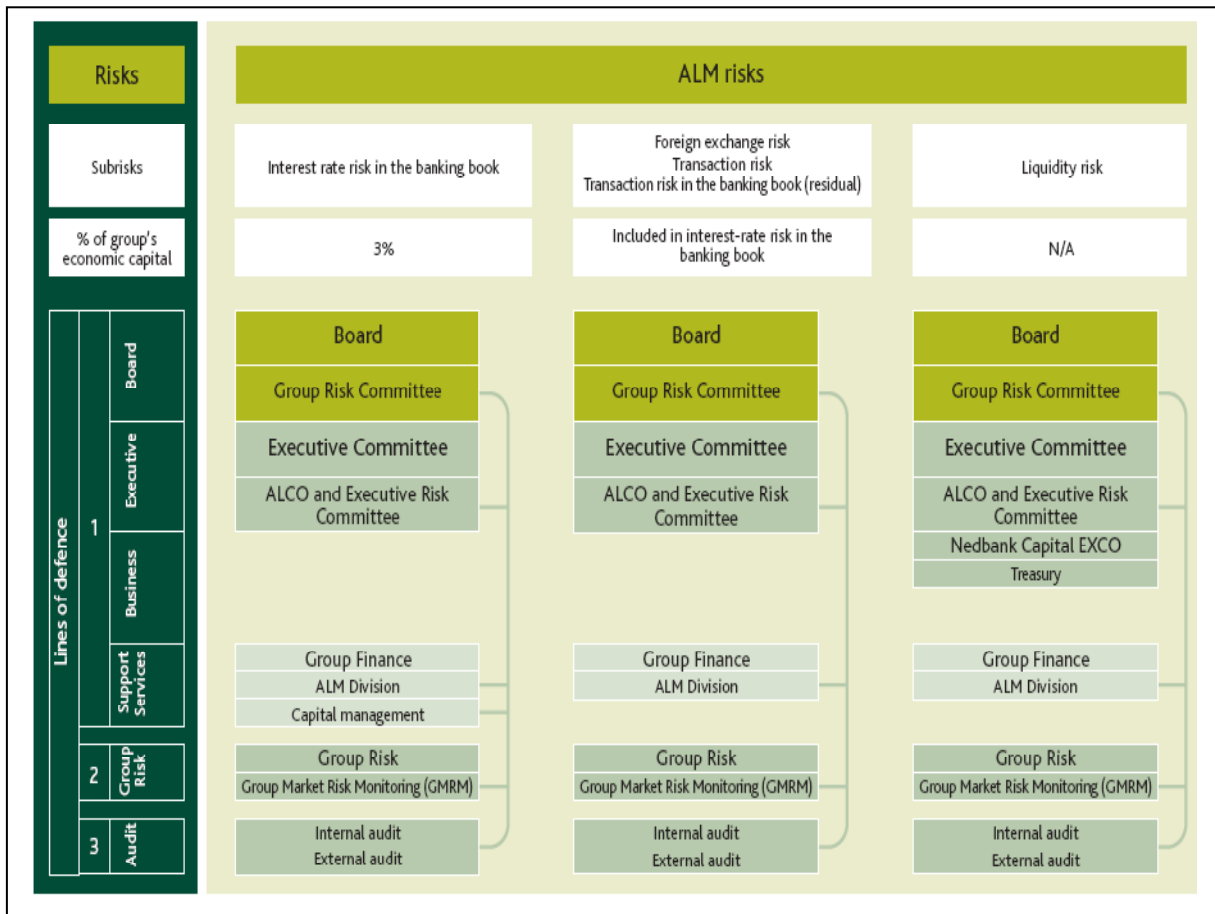
independent core risk management activity whereby its director also reports to the bank audit committee.

Within each business unit, the market risk management division is separate from the operational division and reports to ALCO within each business unit. These units monitor exposures and report risk exceeding the limits daily. It also reports monthly to ALCO and quarterly to bank ALCO and the risk management committee. The governance framework implemented to manage the market risks on banking book positions is called the structural IRR. The structural IRR is caused by different repricing characteristics of financial assets and liabilities. The board of directors and bank risk management committee delegates general authority to take on banking book IRR to the Bank Risk Overseeing Committee (BROC) which delegates to bank ALCO. Bank ALCO sets the risk standards according to the regulatory requirements and international best practices. This ensures that a comprehensive and common governance framework for structural IRR management is followed across the bank. Limits and guidelines are prudently set and reflect the bank's conservative appetite for the structural IRR. Each business unit within the bank has an ALCO to ensure compliance with structural IRR standards and policies.

2.2.2 Nedbank

Nedbank implements a risk governance system to support risk management. The emphasis on risk governance is based on a three-lines-of-defence concept, which is the backbone of the bank's ERM framework. As illustrated in Figure 4.3 below, the ERM framework is supplemented by individual sub-frameworks such as those for credit, market, liquidity, operational and capital risks. This includes the role of the board of directors, which consists of setting and monitoring the bank's risk appetite and overseeing of the ERM framework. The board of directors is assisted by eight subcommittees. At executive management level, the bank Executive Committee is responsible for risk, as well as strategic and operational management which is assisted by eight subcommittees.

Figure 4.3 Nedbank ALM Risk Framework



Source: Nedbank (2006, 131)

The governance structures achieve effective independent monitoring and management of market risk through:

- BRC,
- Bank ALCO and Executive Risk Committee which are responsible for ensuring that the impact of the market risks are effectively managed and that all policy, risk limit and market risk related issues are reported to the BRC,
- An independent function within the bank risk management unit, namely Bank Market Risk Monitoring (BMRM), which monitors the market risks across the bank – a specialist risk area that provides the independent overseeing of market risks, validation of risk measurement, policy coordination and reporting,
- A federal model whereby business clusters are responsible and accountable for the management of market risks originating from their activities, and

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- Specialist investment risk committees within business areas that are responsible for the approval and periodic reviews of transactions.

The board of directors approves the market risk appetite and related limits for both banking and trading books. BMRM reports on the market risk portfolio and ensures that market risk limits are compatible with a level of risk tolerance established by the board of directors.

The bank ALM committee is one of three support functions to the bank ALCO. It facilitates ALCO's responsibility for banking book interest rate, liquidity and currency translation risks. Bank ALM is supported by an established ALM desk located in the dealing room to facilitate the implementation of on- and off-balance-sheet strategies by providing access to products and tools available within bank treasury departments.

2.2.3 ABSA

The overall objective of the risk management process in ABSA is to enhance the shareholder value. Risks are controlled in order to achieve the bank's business objectives and the desired SVA. This objective is met by ensuring that the bank has an integrated and effective ERM framework where all risks are consistently assessed and managed so that the bank achieves an optimal risk-return profile. This entails coordinated risk assessment and management techniques across various risk types that the bank faces. The ERM framework also requires an integrated evaluation of risks across the bank's various locations, legal entities and business units.

The responsibility for risk management falls on the bank management at all levels, from members of the board of directors to individuals throughout the bank. The overall risk management policy and in turn risk appetite are established on a bank-wide basis by senior management, and is reviewed and approved by the board of directors. These policies are communicated throughout the bank and apply to all business units and subsidiaries.

Overseeing of risk management is the responsibility of two board committees – the Bank Audit and Compliance Committee (BACC) and the Bank Risk Committee (BRC). The BACC assists the board of directors with financial information, accounting policies, internal control and compliance issues. The BRC assists the board of directors with risk management and ensures compliance with the requirements of the Bank's Act on risk and capital management.

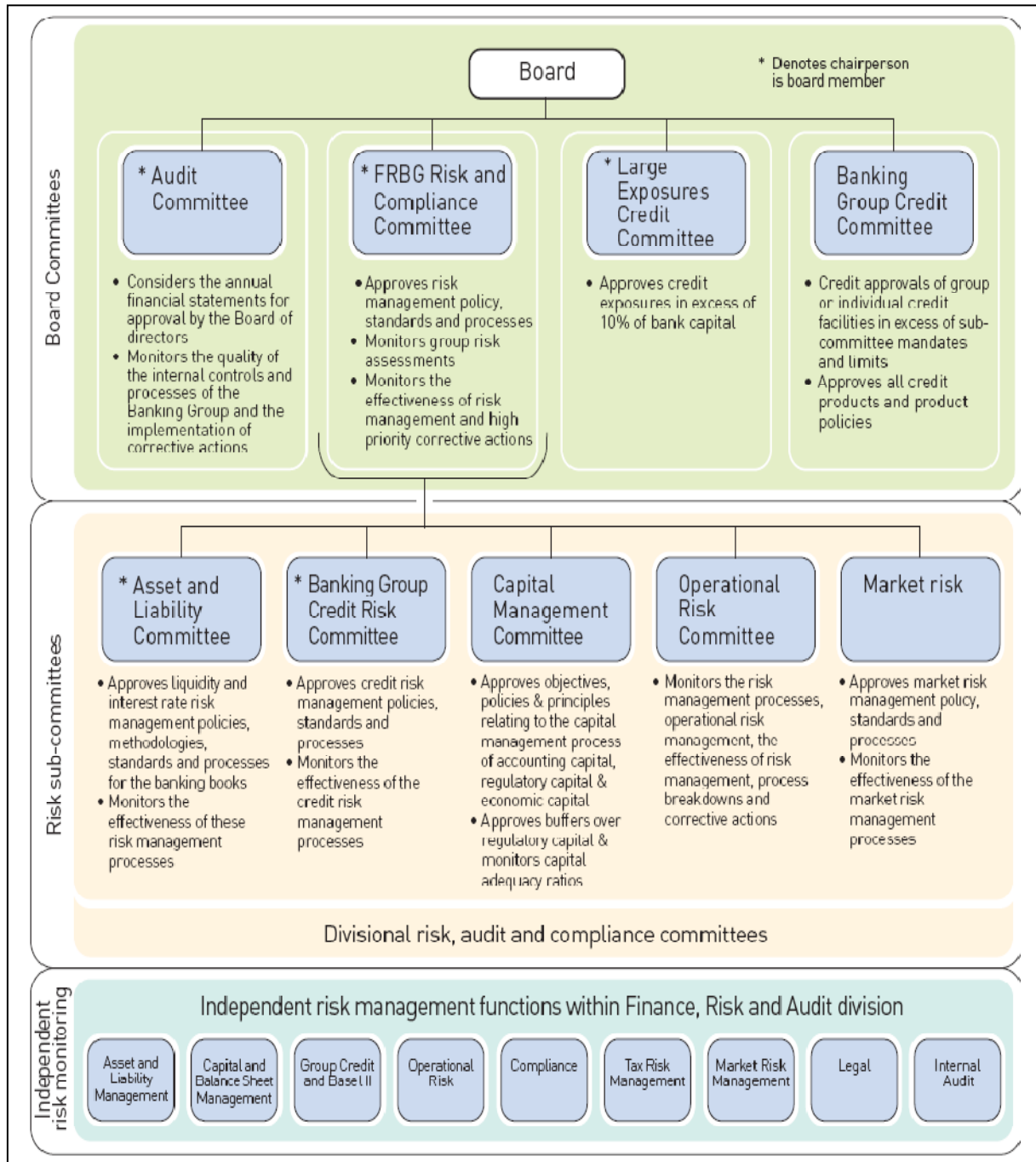
2.2.4 FirstRand Group

A policy of the board of directors is to have risk management in FirstRand Group to be governed by the Business Success and Risk Management Frameworks. In terms of these frameworks, risk management is an integral part of bank management at all levels. Risk management includes the management of governance, strategy, business performance, competitiveness, human resources, external factors, processes, information technology and financial risks. In particular, the financial risks consist of market, credit, interest rate, liquidity, tax and the insurance risks. All risks are managed based on the risk policies and frameworks of the board of directors and its committees and sub-committees. Examples of risk management frameworks are the business, credit, market, operational, compliance and the legal risk management frameworks.

FirstRand Group's risk management approach is to identify, evaluate, mitigate and control risks, and to monitor risks and take the corrective actions. The implementation of the risk management framework of the board of directors is the responsibility of everyone in the bank. The business units of the bank are supported in risk management by the independent risk management functions as well as the internal auditors and governance committees. The internal auditors and governance committees monitor the bank's risks and ensure that the risk management processes operate effectively. The independent risk management functions form part of the finance, risk and audit unit in the bank. This unit is responsible for co-ordinating and monitoring the risk management functions of the bank as well as establishing and driving the implementation of risk management standards, methodologies and processes. Moreover, the risk managers form part of the various business units where they are responsible for supporting the implementation of the risk management framework at business unit level.

The management processes, as illustrated in Figure 4.4 below, are monitored by the independent risk managers and the business unit risk committees.

Figure 4.4 FirstRand Group Governance Structure



Source: FirstRand Group (2006, 16)

All the business units report on the effectiveness of their risk management processes to their relevant risk management functions and risk committees via a bottom-up process. Consolidated assessments, for each of the main business divisions, are submitted quarterly for review by the Risk and Compliance Committee.

The board of directors is responsible for overseeing the risk management and the quality of internal control systems. The board is supported by its committees and sub-committees and the risk management functions.

The risk management governance structure of the bank cascades down from the board of directors to subsidiaries and main business units. All subsidiaries and major business units of the bank have Risk and Audit Committees. All Audit Committees and Risk and Compliance Committees have non-executive representation. The committee meetings are attended by representatives from the external and internal auditors and the independent risk management functions. The independent risk managers attend all Risk Committees as is appropriate.

Through these mechanisms, the transparency and integrity of reports to the board committees are ensured through the presence of external and independent observers at governance levels.

2.2.5 Areas of Improvement

In the context of the South African banking sector, flaws exist in the corporate governance aspect. The SARB annual report (2006) stated that the review of corporate governance in the South African banks highlights areas for improvement in the compliance function, director selection, training, board monitoring of management and unresolved issues, transformation within boards, effectiveness of directors' affairs committees and the segregation of duties. After the initial implementation of the Basel II Accord in 2008, banks in South Africa now need to improve the corporate and risk governance systems to meet the risk management requirements.

In the review above, no mention is made of SIRR and modelling SIRR. However, this does not mean that banks do not have such models. It is not unreasonable at this point to assume that the four major banks do not have such models or systems for the management of SIRR. Otherwise, the annual reports of banks would probably have been mentioned as it would add more credibility to their established risk management practices and would therefore be beneficial from the point of view of investors and clients. However, the common approach in the management of non-trading IRR in South Africa is that risks are measured through repricing GAP analysis and hedged through swap and FRA, whereas monitoring is done via sensitivity analysis.

During discussions with the ALM managers in the four major banks of South Africa, it is clear that IRR is quantified and collected from all business units and is sent to the ALCO for the centralised management rather than the decentralised management at each business unit level. Risk managers stated that the transversal risk management process has not yet been applied in the South African banking sector. At present, the VaR technique is not employed to measure IRR and there is no specific risk limit set for the banking book IRR. The responsibility of hedging banking book IRR falls under the trading section of the treasury department of banks. Since there is no risk limit being set at the identification stage, risks are monitored through the GAP sensitivity analysis rather than monitoring risk limit.

3. RISK MANAGEMENT IN GLOBAL BANKS

According to the PRMIA ERM survey done in 2008 more than eighty per cent of the global banks used either the COSO model or the internationally-recognised ERM framework. The ERM framework or process covers three major risk categories namely the credit, operational and market risks. The risk management process is similar among the developed economies such as the USA and the UK. Another survey done by PWC (2008c: 10) in a report titled “Accounting for change: transparency in the midst of turmoil” reviewed the 2007 financial statements of 22 global banks. The report conducted a representative cross-sectional analysis of the global banks by size, the diversity of operations and the geographical spread. The report focused on the transparency of risk management practice disclosure in the annual reports. Table 4.4 lists the participating banks.

Table 4.4 Global Banks included in PRIMIA ERM Survey

Name of Banks	Web Address
Bank of America	www.bankofamerica.com
Bank of China	www.boc.cn
Barclays	www.barclays.co.uk
BBVA	www.bbva.com
BNP Paribas	www.bnpparibas.com
Citigroup	www.citigroup.com
Commonwealth Bank of Australia	www.commbank.com.au
Credit Suisse	www.credit-suisse.com
Danske Bank	www.danskebank.com
DBS	www.dbs.com
Deutsche Bank	www.db.com
Dresdner Bank	www.dresdner-bank.de
HSBC	www.hsbc.com
ING	www.ing.com
JPMorgan Chase & Co.	www.jpmorganchase.com
Lloyds TSB	www.lloydstsb.com
Nordea	www.nordea.com
Rabobank	www.rabobank.com
The Royal Bank of Scotland	www.rbs.com
Société Générale	www.socgen.com
Standard Bank	www.standardbank.co.za
UBS	www.ubs.com

Source: PWC (2008d, 5)

The report indicates that the implementation of International Financial Reporting Standard (IFRS) 7 did not improve the transparency of risk management disclosure in banks. Most banks did not present a truly comprehensive and clear picture of how they manage risks but choose to comply with the minimum disclosure requirements of IFRS 7. Many of these minimum requirements, particularly those which were quantitative in nature, were not aligned with how banks managed the related risks.

The implementation of Basel II is likely to have a positive impact on the quality of risk management disclosure in the future. Banks are also likely to adopt a more strategic and robust approach to prepare their disclosures as they become more comfortable to explain sensitivities and risk appetites, and are able to benchmark against their peers. This is an evolving process and will take time for consensus to be reached on the approach to risk management disclosure. The subsections that follow take a closer look at the issues of corporate governance, risk management process, risk identification, risk measurement, risk

mitigation, and risk monitoring and reporting.

3.1 Corporate Governance

PWC (2008c: 29) found that the majority of the surveyed banks disclosed information on the monitoring controls over their fair valuation process. Examples related to corporate governance include as follows:

- Valuation models, inputs and assumptions which are validated independently by experts such as the risk management function, senior management and the third party specialists.
- Complex valuation methods applied to positions that are likely to have a material impact on banks' performance are submitted to the Audit Committee.
- Valuation models are subject to regular consistency checks and back-testing.
- Price and parameter inputs, assumptions and valuation adjustments are verified against independent sources.
- Valuations for unlisted securities are checked against a discounted cash-flow valuation model based on the business plans or the valuation multiples of similar companies.
- In the case of correlation-sensitive products, a comparison is made between the results obtained by the valuation model and actual market inputs.
- Other valuation controls include review and analysis of daily profit or loss.

3.2 Risk Management Process

PWC (2008c) found that the risk management process comprises of key steps of risk identification, risk measurement, risk mitigation and risk monitoring and reporting. Specifically, the market risk and IRR management process is realised through monitoring key risk positions, limits, calculations of risk ratings, escalation procedures and risk assessment and scoring.

3.2.1 Risk Identification

The typical definitions of various banking risks are provided. However the risk identification methods are not disclosed.

3.2.2 Risk Measurement

As for prior years, the banks continued to disclose a detailed analysis of VaR as a market risk management tool. However any sensitivity disclosure for risks that were not managed by VaR was not clearly presented or easy to follow.

In addition to the VaR disclosures, eleven of the surveyed banks provided a sensitivity analysis for non-trading IRR. Only four of these banks disclosed the impact on both the P&L and equity. Some banks applied one basis point interest rate shock, while others applied fifty, one hundred or two hundred basis point shocks.

3.2.3 Risk Mitigation

The derivative instrument definition, transactional values and exposures by risk types are provided. However, the detailed hedging procedures are not disclosed.

3.2.4 Risk Monitoring and Reporting

In general, the monitoring and reporting procedures are in line with the risk governance principles and policies of the banks except when there are specific guidelines designed for non-trading IRR.

SUMMARY AND CONCLUSION

This chapter reviewed information on bank risk management systems/approaches of major global and South African banks. The banks generally follow a risk management process as recommended by Basel II and related guidelines for market risk management consisting of the key stages of risk identification, measurement, mitigation, and monitoring and reporting. One important aspect that is evident is that the risk management process of most banks is situated centrally under the ERM framework. Banks in developed economies follow a similar risk management process as recommended by the Basel II Accord. Four key elements (risk identification, risk measurement, risk mitigation, and risk reporting and monitoring) form the

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major part of a bank's risk management process. At present, there is not a general framework process being implemented for the SIRR management on the banking book in South Africa. The four major banks and to a lesser extent the SMBs in South Africa have adopted a similar ERM and risk management process even though there are slight differences in terms of the risk definitions and the number and order of steps in the risk management process. Specifically, the ERM process starts from the board of directors level at the top of the management structure in banks, flows to risk management committees and subcommittees, and reaches risk management functions at the bottom. Risk management functions apply to all management levels and major business units in banks. Finally, audit and compliance committees attempt to ensure the effective and efficient performance of the ERM framework. For the risk management process, banks adopt the feedback-loop model including key steps of risk identification, measurement, mitigation, and monitoring and reporting. Risk management techniques employed in each step of the process are very similar. For instance, they commonly use historical simulation VaR to measure the market risks and monitoring. Interest rate swaps and FRA's are major hedging instruments against unexpected banking-book IRR. Moreover, in market risk management, the simplified method is suited to banks with "vanilla-type" trading¹ books and a few systems supporting their trades. The building block method is suited to banks with significant exposures which manage risks internally with relatively manual processes and systems.

The Internal Model Approach (IMA) adopted by individual banks allows them to use sophisticated risk management systems to manage and report risks, as well as calculate capital adequacy (SARB, 2006).

¹ It could also apply to the banking book.

CHAPTER FIVE: BANK INTEREST RATE RISK MANAGEMENT

1. INTRODUCTION

As financial intermediaries, banks are exposed to various kinds of risks such as credit, interest rate, foreign exchange rate, liquidity and operational risk. Risk exposures are interrelated to each other as one risk event may affect one risk type that in turn triggers the sources of the other types of risks. Senior management and the board of directors in banks should pay close attention in order to improve risk management systems, frameworks and processes. Through the risk management process, the overall level of risk is identified, measured, mitigated, and monitored and reported.

In this chapter, bank IRR management is discussed in terms of the risk management framework, system, process and its components. The following section explains the risk management framework and structure in bank IRR management.

2. RISK MANAGEMENT FRAMEWORK AND STRUCTURE

In this section, the ERM framework is reviewed and the risk management structure of the bank is discussed in detail. The purpose of this section is to give an overview of bank risk management which governs the function of the risk management system, process and their elements which will be discussed in the remaining parts of the chapter.

2.1 Risk Management Framework

Exposure to financial risk is a concept that has been prevalent in the business environment for a long time. However, there is not a common definition of risk management and a comprehensive risk management framework. The risk management framework outlines how the process should work. The lack of such a framework reduces the effectiveness of risk communication among board members and management (Institute of Internal Auditors, 2003).

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A comprehensive risk management approach is called the ERM which is discussed in chapter four. Examples of such frameworks are COSO ERM framework, Sarbanes-Oxley (SOX) S404, and the Turnbull Report (Datamonitor, 2006).

The risk management framework follows the line that starts from top level management which is the board of directors. In order to meet the bank's business objectives, the board of directors undertakes risky business and delegates risk-taking authority to the Chief Executive Officer (CEO). The CEO in turn delegates authority to the management of business units in the bank through capital allocation or risk delegation. However, most banks start to lose alignment along the risk delegation hierarchy. Therefore, the bank's management need to ensure that risk-taking activities are coordinated throughout the bank and undertaken in line with the bank's business and financial objectives (Berley, 2008).

ERM is a process that is implemented by the bank's board of directors, all levels of management and risk management staff. ERM is part of the business strategy of the bank which is designed to identify risky events which the bank undertakes to manage and control risks within the bank's risk appetite and to ensure the achievement of the bank's business and financial objectives. In addition, ERM is not a serial process but a multidimensional and iterative process. In other words, one element of the ERM process does not have to affect the next element that follows although all the stages are interrelated with each other. Therefore the elements in the framework can, but do not necessarily, influence one another (COSO, 2004: 2-4).

The COSO ERM framework supports a portfolio risk management approach throughout banks. In most cases, each business unit of a bank should have this risk management function. Financial risks identified in different units are aggregated and measured as a portfolio of risks. Therefore, the COSO ERM framework manages risks on a consolidated basis. Risk is best managed at the highest level in the enterprise.

The bank's risk management framework identifies the downside risks and manages them through the risk management process. Upside risks are addressed by the strategy and objective setting processes of banks (Institute of Internal Auditors, 2003).

2.2 Risk Management Structure

There are two key types of risk management structures, namely centralised and decentralised structures. The centralised structure is used by most banks around the world. This structure requires an integrated treasury management function, which has the advantages of the risk aggregation and reporting to the top management of banks.

The board of directors takes the primary responsibility of risk management. It sets risk limits by evaluating the bank's risk tolerance level. At the organization level of banks, the entire risk management responsibility is delegated to an independent risk management committee that reports directly to the board of directors. The risk management committee ensures that the management of each business unit is responsible for the risk control and consequently the business performance of the business unit and the bank as a whole.

The key functions of the risk management committee are to identify, measure and monitor the banks' risk profile. The other functions include the development of risk policies and procedures, the revision of risk models and the identification of the new types of risks. Risk policies should specify risk limits for the different segments of the banks' operations. Internationally, risk limits are assigned based on the portfolio standards, Credit at Risk (CaR), EaR, or VaR. Moreover, the risk management committee defines various stress scenarios to measure the impacts of the unusual movements of the market variables such as the interest rate. The risk management committee monitors the performance of the risk measures through comparisons between the actual volatility of the portfolio value and those estimated by the risk measures. The risk management committee also monitors the operational departments' compliance with risk parameters such as risk limits on interest rate sensitive products (Securities.com, 2008).

3. THE RISK MANAGEMENT PROCESS

Risk management requires professional skills and is dealt with by risk specialists. The risk management process is not integrated with the strategic decision-making process of banks. It becomes increasingly important to incorporate all aspects of the banking businesses into the risk management process.

Efficient communications and information transparency are essential to the risk management

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process. A central risk management unit is an integral part of the process. This is particularly the case when banks have a large number of employees and multiple branches.

Datamonitor (2006) stated that the risk management function should include the following elements:

- The risk management system that should be organised in accordance with the organisation structure of the business
- A comprehensive approach that measures the risks, which include all types of risks in the bank - therefore, a comprehensive measurement and management of all risks that the bank is exposed to
- Risk management policies that are in line with business strategies, capital strengths, management expertises and risk tolerance levels
- The risk management guidelines that oversee risk-taking activities and specify risk limit structures
- An effective management information system that supports control and that helps monitor and report risks
- Effective risk control, systematic framework and the adequate procedures
- A risk management framework that functions independently from the operational business units and has a management structure that supports the delegation of responsibility for the management of risks
- A periodical review and evaluation of risk management performances

African Bank Investments Limited (2007) stated that each business unit is responsible for its own risk management. The risk management objective is to identify, measure and monitor risks within the bank. The risk management unit plays a role that facilitates the risk management of each business unit. Risk management units intend to help business units achieve their goals, thereby helping the bank achieve its strategic objectives.

Sasfin Bank (2008) stated that the risk management policies of the bank are formulated to

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identify and measure risks to which the bank is exposed, set risk limits, control the risks, monitor the risks and the compliance of such risk limits, and finally report risk management performances. Risk management policies and systems are reviewed periodically in order to reflect the new market developments and changes in product and service offerings. The bank develops a risk control environment through training and management activities. All employees are empowered to understand their roles and responsibilities in such a constructive risk control environment.

Sasfin Bank adopted a three line of defence risk management model as follows:

- Business unit risk management is the first line of defence. Risk assessment and measurement activities are incorporated into the daily activities of each business unit. The risk management process within each business unit includes risk policy implementation, the identification of the key risk factors, and the implementation of the correctional measures if necessary. The results of risk management are periodically reported to governance bodies in the bank.
- The risk management unit forms the second line of defence. The risk management unit is independent of the risk management at the business unit level. The risk management unit designs the bank's risk management framework and policy, it oversees the risk management performance, and reports to the senior management, the board of directors, and the Risk and Capital Committees of the bank.
- An internal audit is the third line of defence. It evaluates the bank's risk management framework and reports to the bank's audit and compliance committee.

Mercantile Bank (2007) stated that the bank implements a risk management cycle that consists of four phases as follows:

- Risk identification and comprehension

The phase of risk identification recognises and assesses the current risk exposures. It also evaluates risks that emerge from the future risk-taking activities.

- Risk measurement and evaluation

After all risk exposures are identified in the first phase, they are measured in the second phase. The identified risks are then quantified.

- Risk management as an independent function

The bank's major risk types are managed through an independent risk management unit. The ALCO and the bank's risk management committee hold regular meetings and discuss issues such as risk control measures, risk tolerance and the setting of risk limits.

- Risk monitoring and compliance with the risk policies

The communications between the bank and the SARB are critical to the risk monitoring and supervisory process. The management of the individual business units report risk performance results to the ALCO and the bank's risk management committee. The results are then sent by the bank's finance unit to the SARB through the DI returns and the periodical meetings.

4. THE RISK MANAGEMENT SYSTEM

An effective risk management system requires an effective management information system. Management information systems still lack improvement in certain areas of the data collection. Integration of systems seems to be a problem. Special skills are required for risk management. Banks tend to use advanced tools and techniques to measure and control risks. The majority of multinational banks and large banks have adopted the internal model for risk management. This is also attributed to competition among banks (Securities.com, 2008).

As offshore business expands, banks should be prepared and possess adequate risk management expertise to effectively control all risk exposures. The head-office staff of banks should be trained in areas of the modelling and analysis of risks.

Due to the fact that the balance sheet structure varies from bank to bank, there is not a uniform risk management framework adopted by banks in South Africa even though there are principles that are present in their risk management systems. The current Basel II guideline provides comprehensive instructions for banks to follow and build the standard of its internal risk management model. An individual bank may emulate a banking sector framework and

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therefore design its risk management framework that takes into account the size of the bank, the complexity of the risk management function, the special risk management skills, and the effectiveness and efficiency of the management information system.

In the international banking industry, risks are managed through a committee approach. The ALCO handles issues that relate to various types of market risks such as the IRR. The Credit Policy Committee (CPC) manages credit and country risks. Hence, market and credit risks are managed separately in banks. However, a bank should also set up a committee that manages market and credit risks together due to their high correlations in the recent past. For instance, the current financial crisis illustrated that the unhedged market risks are significantly related to the credit risks (Basel Committee on Banking Supervision, 2009). The economic crisis in some countries has revealed a strong correlation between the unhedged market risk and the credit risk (Securities.com, 2008). Therefore, the combination of the activities of the ALCO and the CPC is an area where banks could improve their risk management systems.

One area considered needing further improvement is the consultation process that assesses the effect of market and credit risks on the financial performances of banks. Another improvement that may be considered is the incorporation of market risk elements into the credit risk management process. Due to the fact that the policies and procedures for market and credit risks normally originate in two different places, namely the ALM and the loans and advances departments. There is also lack of inter connectivity between these two departments.

The market risk management should enjoy the first priority of the high level management of banks. The board of directors formulates risk management PPS, risk limits and monitoring and reporting systems. Risk management policies should address the banks' total risk exposures and specify the risk measurement system through which the consolidated risk exposures are assessed. Ideally, the IRR measurement system captures all types of IRRs and evaluates the impact on the banks' financial performances and sensitivity.

Risk limits and risk responsibility within each business unit should be clearly defined and assigned in market risk management policies. For market risk management, the ALCO is the top-level operational unit below the board of directors. The ALCO is responsible for the risk management that is related to balance sheets, and follows the PPS approved by the board of directors. A middle-office should be put into place to monitor and control the daily risk-taking

activities of banks. The middle-office is placed under the ALCO and its key employees are the market risk professionals, economists, statisticians and the general managers in banks.

The middle-office is independent of the treasury department of banks. The daily activities of the middle-office are separated from the treasury department. The function of the middle-office is to ensure that the top level management, the ALCO and the treasury department of banks comply with the risk parameters as set out in the PPS. Total market risk exposures are consolidated across all risk types on a daily basis (Basel Committee on Banking Supervision, 2009).

5. IRR DEFINITION, IDENTIFICATION AND PRIORITIZATION

In this section, the various drivers of IRR exposures are defined, the methods for IRR identification are illustrated through current practices in banks, and the risk prioritization issue is discussed by reviewing the risk survey of the global banks done by the PWC.

5.1 Definition of IRR Exposures

IRR is the single most important financial risk that a bank is exposed to and needs to be defined. In this section, the key IRR exposures are discussed and reference is made to gap, basis, embedded-option, yield curve, price, reinvestment and the net interest position risks.

Gap or mismatch risk

Gap or mismatch risk emerges from assets and liabilities on the balance sheet that undergo rate changes (reprices) at different time intervals thereby creating sensitivity to yield curve changes.

Basis risk

Basis risk arises from imperfect correlation in the adjustment of the rates earned and paid on different instruments with otherwise similar repricing characteristics. When interest rates change, these differences can give rise to unexpected changes in the cash flows and earnings spread between assets, liabilities and off-balance-sheet (OBS) instruments of similar maturities or repricing frequencies (Basel Committee on Banking Supervision, 2004). Basis

risk is high when a diverse asset portfolio is funded by diverse liabilities. This risk is significant when market interest rates become volatile and may reduce the banks' NII.

Embedded-option risk

Another factor that causes IRR is the general movements of market interest rates. One way in which this risk worsens the banks' profitability is through the prepayment of the banks' assets such as cash credits, demand loans and term loans. Another way is through exercising call or put options on the banks' liabilities such as bonds, debentures and the early withdrawal of term deposits before maturities. These risks are referred to as embedded-option risks.

Embedded-option risks are significant when interest rates fluctuate. The more frequent and larger the degree of changes in the interest rates, the more significantly the embedded-option risks affect the banks' NII. Hence, banks should develop techniques to accurately measure the embedded-option risks that negatively affect the banks' NII and thereby the distribution of returns. The GAP statements are then adjusted to account for changes in the interest rate sensitivity of the banking products and instruments.

Yield curve risk

Yield curve risk occurs when banking products and instruments are linked to floating market interest rates such as the Treasury-bill rates, call money market rates and the JIBAR. If banks price their assets and liabilities based on those reference rates, the NII may be negatively affected. The risk is caused due to the fact that assets and liabilities mature at different times and may undergo rate changes. Assets and liabilities reprice but may not necessarily be affected to the same degree, thereby potentially exposing NII to adverse rate changes.

Yield curve movements become frequent when the economy goes through the business development cycle. Therefore, banks should assess yield curve movements and their effects on the values of banking portfolios and interest incomes.

Price risk

The price risk is related to the trading book. The trading book is created to profit from short-term changes in interest rates. This risk is caused by an inverse relationship between the bond price and the interest rate, and occurs when assets are sold before maturity. The measures that

banks use to minimise the price risk are to limit the portfolio size, holding period, duration and the marking to market.

Reinvestment risk

The reinvestment risk occurs when there exists uncertainty relating to future cash flows which may be reinvested at an interest rate that is lower than that at the beginning of the holding period. These changes in the interest rates cause the mismatch of cash flows. Banks are exposed to fluctuations in the NII when the interest rates move in the different directions.

Net interest position risk

When banks have more interest-earning assets than interest-paying liabilities, it indicates that banks have positive net interest positions. The IRR arises when market interest rates decline. Hence, banks with positive net interest positions are likely to experience a reduction in the NII as market interest rates decrease. The NII will increase when market interest rates rise, assuming assets and liabilities are linked to floating or variable rates.

5.2 IRR Identification

Securities.com (2008) stated that as the banking sector becomes deregulated, the market risks such as the IRR arise from the adverse movements of market variables such as interest rates. In most cases, a small change in market variables may significantly change the incomes and economic values of banks. Market risks are identified and grouped into the following major categories:

- Liquidity risk
- IRR
- Foreign exchange rate risk
- Commodity price risk
- Equity price risk

Mercantile Bank (2007) stated that the IRR may originate from volatility and changes in

interest rate levels, yield curves and yield spreads. These risk sources affect the interest rate margin between lending incomes and borrowing costs. The IRR becomes significant where rate sensitive-assets and -liabilities are concerned. Banks in South Africa are also exposed to basis risk. This risk is caused by differences in the repricing characteristics of two floating-rate indices such as the South African prime overdraft rate and the three-month JIBAR.

In the South African commercial banking sector, there is not a common method for IRR identification due to the different balance sheet structures of individual banks. In this study, the risk identification method is reviewed through the annual risk reports of banks in South Africa.

Mercantile Bank (2007) stated that the bank has a risk management process in place through which the top ten risks that the bank is exposed to are identified. These risks are assessed by a risk score assigned to both the inherent and residual risks of portfolios. The risk mitigation plans are designed to reduce the identified inherent risks to a level that is within risk limits. Moreover, the top ten risks are re-evaluated quarterly. Mercantile Bank defines and identifies the major risk categories with the risks categorised into two groups as follows:

- Direct risks. This risk category exists within the majority of transactions of a bank. Direct risks can be easily defined and measured. These risks are quantified through the bank's databases, statistics and the other records. Examples are the credit, counterparty, currency, liquidity, interest rate, market position, solvency, operational, technology and the compliance risks.
- Indirect risks are present in almost every decision made by management and the board of directors. These decisions are made to improve the bank's performance in the long term. Indirect risks are often related to strategic decision-making and are difficult to quantify. Examples are the strategic, reputation, legal, fraud, international, political, competitive, pricing and the sensitivity risks.

Investec (2008) stated that the bank is exposed to the repricing risk due to the timing differences in the fixed-rate maturity and the floating-rate repricing of assets, liabilities and the derivative instruments. Measures that are designed to manage identified IRR are as follows:

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- The board of directors delegates the risk responsibilities to the management of individual business units to undertake market risks. Risk limits are set for individual business units and are used as a metric to monitor if financial losses exceed risk tolerance levels when there are new developments in market variables.
- New investments need to go through the formal authorisation and deal sanctioning process. Market risks for new investments are managed by taking into account the purpose of investments. Market risk management strategy is in line with the general business strategy of the bank.

5.3 IRR Prioritization

In 2008, the Centre for the Study of Financial Innovation conducted an annual on-going survey in banking risk management. The global top thirty risk exposures are ranked in Table 5.1.

Table 5.1 The Top Thirty Risk Exposures in the Global Banking Sector, 2008

Banking Risk Rankings in 2008 (the 2006 ranking is indicated in brackets and (-) indicates no change from the 2006)			
1 Liquidity risk	(-)	11 Fraud	(11)
2 Credit risk	(2)	12 Commodities	(4)
3 Credit spreads	(-)	13 Currencies	(13)
4 Derivatives	(3)	14 Rogue trader	(27)
5 Macro-economic trends	(14)	15 High dependence on technology	(6)
6 Risk management techniques	(10)	16 Corporate governance	(8)
7 Equities	(12)	17 Management incentives	(26)
8 Too much regulation	(1)	18 Emerging markets	(9)
9 Interest rates	(5)	19 Back office	(24)
10 Hedge funds	(7)	20 Retail sales practices	(22)
		21 Conflicts of interest	(16)
		22 Political shocks	(15)
		23 Business continuation	(21)
		24 Money laundering	(18)
		25 Environmental risk	(25)
		26 Banking market over-capacity	(17)
		27 Payment systems	(29)
		28 Merger mania	(19)
		29 Too little regulation	(30)
		30 Competition from new entrants	(28)

Source: PWC (2008b, 4)

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The main risk exposure that the global banking sector was exposed to in 2008 is liquidity risk. Many economies have been in a dire state without any change since the USA subprime crisis that happened in the second half of 2007. The lack of funding strategies and capability to sell assets causes banks to suffer from significant liquidity risks. These difficulties are expected to continue and have spill-over effects on the other economies globally (PWC, 2008b: 4).

Banking sectors in many economies experienced difficulties in handling risks related to the use of derivatives. Derivatives risk exposure was ranked fourth in the 2008 survey. This is the case particularly where credit derivatives are used in structured products. The subprime mortgages are the underlying assets of these structured products. Derivatives risks are expected to continue to be a difficult task for the risk professionals to manage as these risks are likely to cause further liquidity and credit risks. In general, the subprime crisis raised doubts about the effectiveness of the bank risk management techniques. Concern over bank risk management techniques used was ranked tenth in 2006 and moved up to sixth position in 2008 (PWC, 2008b: 4).

Other market risks that were ranked high in the list were IRR (ranked ninth), commodity risk (ranked twelfth) and the currency risk exposures (ranked thirteenth). All three types of market risks are expected to have high volatilities. In particular, interest rates are expected to fluctuate more frequently since the central bank balances the conflicting pressures of the economic slow-down and rising inflation. For instance, when the economy is in the downward phase, central banks tend to lower the interest rate to boost demand and therefore economic growth. However, the inflation rate is likely to increase due to rising demand and therefore eroding real returns. This requires the central bank to raise interest rates again to curb the inflationary pressure. Therefore, during the period of economic slow-down and increasing inflation, the central bank needs to set policy priorities for economic growth recovery (PWC, 2008b: 5).

In comparison to industrial economies, the top ten risk types are ranked differently in emerging economies such as South Africa. Table 5.2 below illustrates the rankings of both emerging and industrial economies. The liquidity and credit risks are the top two risks for both economies. However, IRR appears in the top ten risk exposures for emerging economies as opposed to the industrial economies. This is to a large extent attributed to the lower ability of central banks to curb the inflation rate and boost the economic development during the

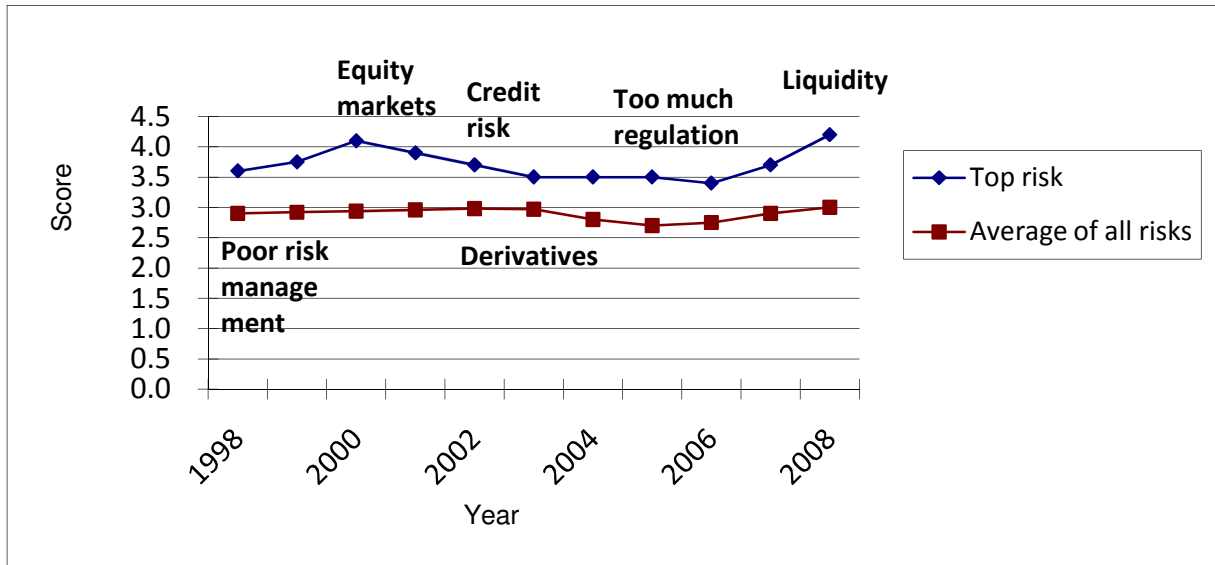
period of the financial crisis.

Table 5.2 The Top Ten Banking Risks in Emerging and Developed Economies, 2008

Emerging Economies	Developed Economies
1 Liquidity risk	1 Liquidity
2 Credit risk	2 Credit risk
3 Derivatives risk	3 Credit spreads
4 Macro-economic trends	4 Derivatives
5 Equity risk	5 Macro-economic trends
6 Credit spreads	6 Risk management techniques
7 Interest rate risk	7 Equity risk
8 Risk management techniques	8 Over-regulation
9 Fraud risk	9 Hedge funds management and risk
10 Currency risk	10 Commodity risk

Source: PWC (2008b, 10)

Figure 5.1 below illustrates the banking risk index between 1998 and 2008 in the banking sectors globally.

Figure 5.1 The Banking Risk Index

Source: PWC (2008b, 6)

The banking risk index records the survey responses over a period of time. This index reflects the levels of the respondents' anxiety towards risks exposures. The top line shows the average score given to the worst risks over the last ten years, and the bottom line gives the average score of all the risks. The two lines reached a historically high level in 2008, indicating a high level of concerns towards risk exposures in the market (PWC, 2008b: 6) with concern over liquidity risk reaching record highs in 2008.

During the course of the banking risk index compilation, the financial sector suffered significant losses in 1998 and after that when the dot com bubble burst during the early 2000s. Even though the top risk score line peaked in 2000, the average anxiety level of all risks continued to increase until 2002 (See average line in Figure 5.1). Another noticeable rise in the average anxiety level appeared in 2006 while the top risk anxiety level decreased slightly. This information reflects the fact that the heavy regulation or over-regulation was ranked as the worst risk exposure in the two consecutive years of 2005 and 2006 (PWC, 2008b: 4).

With regard to the readiness of the banks' risk management, only a quarter of the surveyed banks indicated that they are "well-prepared" for risk management in 2008. The proportion dropped in comparison to the two thirds of the same group of banks surveyed in 2006. However, the proportion of banks that responded with "poorly-prepared to manage risks" decreased from fourteen per cent in 2006 to four per cent in 2008. The majority of

respondents give a mixed response while bankers are more bullish than non-bankers and regulators (PWC, 2008b: 6).

Figure 5.2 below shows the ranking of the top ten risk exposures between 1996 and 2008. Nine surveys were carried out during this period.

Figure 5.2 The Top Ten Global Banking Risks from 1996 to 2008

1996	1997	1998
1 Poor management	1 Poor management	1 Poor risk management
2 Bad lending	2 EMU turbulence	2 Y2K
3 Derivatives	3 Rogue trader	3 Poor strategy
4 Rogue trader	4 Excessive competition	4 EMU turbulence
5 Excessive competition	5 Bad lending	5 Regulation
6 Emerging markets	6 Emerging markets	6 Emerging markets
7 Macro-economic threats	7 Fraud	7 New entrants
8 Back office failure	8 Derivatives	8 Cross-border competition
9 Technology foul-up	9 New products	9 Product mis-pricing
10 Fraud	10 Technology foul-up	10 Grasp of technology
2000	2002	2003
1 Equity market crash	1 Credit risk	1 Complex financial instruments
2 E-commerce	2 Macro-economy	2 Credit risk
3 Asset quality	3 Equity markets	3 Macro economy
4 Grasp of new technology	4 Complex financial instruments	4 Insurance
5 High dependence on tech.	5 Business continuation	5 Business continuation
6 Banking market over-capacity	6 Domestic regulation	6 International regulation
7 Merger mania	7 Insurance	7 Equity markets
8 Economy overheating	8 Emerging markets	8 Corporate governance
9 Comp from new entrants	9 Banking market over-capacity	9 Interest rates
10 Complex fin. instruments	10 International regulation	10 Political shocks
2005	2006	2008
1 Too much regulation	1 Too much regulation	1 Liquidity
2 Credit risk	2 Credit risk	2 Credit risk
3 Corporate governance	3 Derivatives	3 Credit spreads
4 Derivatives	4 Commodities	4 Derivatives
5 Hedge funds	5 Interest rates	5 Macro-economic trends
6 Fraud	6 High dependence on tech.	6 Risk management
7 Currencies	7 Hedge funds	7 Equities
8 High dependence on tech.	8 Corporate governance	8 Too much regulation
9 Risk management techniques	9 Emerging markets	9 Interest rates
10 Macro-economic trends	10 Risk management	10 Hedge funds

Source: PWC (2008b, 10)

6. IRR MEASUREMENT

This section gives an overview of how the IRR is measured, and differentiates between the trading and banking IRR.

6.1 Measuring IRR

IRR can only be managed once it is identified and measured. The magnitude of the IRR should be identified first so that the degree of risks to which banks are exposed can then be measured. A good understanding of the banks' risk positions will facilitate the development of the risk management strategies and the hedging techniques.

As discussed in section five, all types of IRR such as mismatch risk, basis risk, embedded-option risk, yield curve risk, price risk, reinvestment risk and the net interest position risk should be captured through the IRR measurement system. IRR measurement systems should also consider the properties of specific interest rate sensitive positions and detect all possible interest rate movements.

Many banks use a combination of different IRR measurement tools such as the maturity GAP analysis, duration, simulation or VaR. Banks use all of these measurement tools since they reflect the different aspects of the IRR. For banking book IRR, the mostly-used tool is maturity GAP analysis while VaR is adopted for trading book IRR measurement. Alternatively, banks may adopt the hybrid methods that combine the functions of all the IRR measurement tools (PWC, 2008c).

The risk measurement approach differs when the different segments of the balance sheet are considered. In an effective risk management system, the balance sheet is divided into two broad categories: namely trading book and banking book. Trading book generates short-term profits by taking advantage of differences in prices or yields. In comparison, the banking book comprises the contracted assets and liabilities that are usually held to maturity such as loans and advances and deposits from the public respectively. Hence, price risks are related to trading book while banking book mainly focuses on changes in earnings and economic values.

6.2 Trading Book

As proposed in the Basel Accords, the VaR methods are widely adopted to measure price risks caused by changes in market variables such as interest rates. At a predefined confidence level of between ninety five per cent and ninety nine per cent and for a certain holding period, internal VaR models measure the potential losses on portfolios due to changes in interest rates and prices. Theoretically, the VaR method will only produce an accurate measure of risks when all of the market risk factors to which trading positions are exposed are taken into

account.

The bank-wide VaR risk limits should be set for trading portfolios. The VaR risk limits are then assigned across different business units and trading desks. The potential adverse impacts on earnings are managed through setting loss-making tolerance levels and controlling losses within the banks' risk tolerance levels (Basel Committee on Banking Supervision, 2004)

One advantage of the VaR technique is that risk measurement results are comparable among banking products, trading desks and business units. The back-testing method is often used to evaluate the performance of the VaR models. Even though a significant amount of the historical data is required for the VaR calculation, the VaR may not provide an accurate estimation for future financial losses based on the historical data. The effectiveness of the VaR method diminishes under volatile market conditions. In this case stress-tests are employed to supplement the VaR models by estimating potential future financial losses caused by the stressful events. The stress-testing procedure takes into account potential large market movements which occur in the tails of the loss distribution.

Scenario analysis may also be used and it incorporates the historical stress-events. The historical impacts are applied to estimate financial losses when similar stress-events are expected to occur in future. Scenario analysis links the hypothetical, simultaneous and the related changes in multiple risk factors to determine the impacts of changes on the rest of a portfolio. When there is a lack of data for the VaR calculation, non-statistical methods such as stop-loss and gross or net positions are used (Securities.com, 2008).

6.3 Banking Book

The movement of market interest rates can cause changes in earnings and the economic value of the banking book portfolios. Due to a wide range of banking book products, banks should implement IRR measurement systems to assess the impact of market changes on these products.

Examples of risk measurement techniques to measure the banking book IRR include simple maturity and repricing GAP analysis, static simulation and dynamic modelling. Static simulation is based on the current on- and off-balance sheet positions, whereas dynamic modelling incorporates behavioural patterns of assets, liabilities and off-balance sheet items.

Dynamic modelling can measure the various types of IRRs such as basis, yield curve and embedded-option risks (Securities.com, 2008) discussed earlier.

Investec Limited (2008) stated that the bank uses a combination of risk measurement tools to assess the IRR on banking book. Examples include repricing GAP, NII sensitivity analysis, economic value sensitivity and stress-testing to macroeconomic developments. These measurement tools highlight the impacts of interest rate changes on the NII and the economic values of the bank to senior management.

Sasfin Bank (2007) stated that the bank manages the IRR by controlling risk exposures within interest rate gap limits. The IRR measurement system is supplemented by monitoring the sensitivities of the banks' assets and liabilities to different interest rate scenarios. The standard interest rate shock is realised through shifting up or down all yield curves by a parallel two hundred basis points. Moreover, cash flow mismatches are measured through a dynamic maturity GAP and duration analyses.

Mercantile Bank (2007) adopted the standard two hundred basis-point parallel shifts of yield curves to measure the IRR. In addition, the IRR sensitivity analysis is conducted on the reporting date to determine the bank's exposure to interest rates. In the next section, the issues that are related to the mitigation of the IRR are discussed.

7. IRR MITIGATION

Banking book IRR is transferred from each business unit to the treasury department in the bank. The IRR is then aggregated or netted. The treasury department is responsible for the funding of assets on the balance sheet and the mitigation of the residual risks.

The fixed-rate loans are exposed to the IRR that is transferred from the business unit to the treasury department through match-funding. The treasury department then hedges the fixed-rate loan assets collectively. Specifically, fixed-rate loans with a term to maturity of one year or more can be hedged on a deal-to-deal basis. Fixed-rate loans with a repricing period of three months or less are hedged through variable or fixed interest rate swaps. The treasury department also hedges all fixed-rate deposit liabilities. Risk limits are set to ensure that there is no undesirable risk left in each business or product area. The risk mitigation process is facilitated by technical interest rate analysis and macroeconomic developments in each

geographical location and globally.

The treasury department may take advantage of changes in interest rates and profit from statutory or surplus liquid asset portfolios. These portfolios appear in the banking book but are marked-to-market. Risks associated with these portfolios are managed within predetermined risk limits (Investec, 2008).

If the bank expects market interest rates to decline for an extended future period, in order to reduce the NII losses, the bank may decide to swap out fixed-rate assets or liabilities. The decision is made by the ALCO of the bank. The ALCO also takes into account the terms and durations of fixed-term funding arrangements. Prices are negotiated in the medium-to-long term interest rate environment (Capitec Bank, 2008).

The IRR exposure that originates from deposit liabilities can be reduced through an appropriate mix of fixed- or floating-rate deposits. Another way to mitigate such risk exposures is to use interest rate swaps. Through exchanging differences between fixed and floating interest rates on notional principal amounts, the bank mitigates the adverse impact of changing interest rates on the value of fixed-rate deposit liabilities. Cash flow exposures are reduced on variable-rate deposit liabilities. In addition, interest rate swaps reprice quarterly and floating interest rate is based on three-month JIBAR. The bank settles differences between fixed and floating interest rates on a net basis (Mercantile Bank, 2007).

8. IRR MONITORING AND REPORTING

Effective risk monitoring comprises of three elements: namely ongoing monitoring, separate evaluations, and reporting deficiencies (The Institute of Internal Auditor, 2005).

Investec Bank (2008) stated that the risk monitoring function is performed by the risk management department of the bank. By monitoring risks, the risk management department ensures that the ERM framework functions well. The bank achieves the goals of risk monitoring through the following procedures:

- The establishment of risk policies reflecting risk principles, appetites and tolerances
- The creation of risk identification and management processes

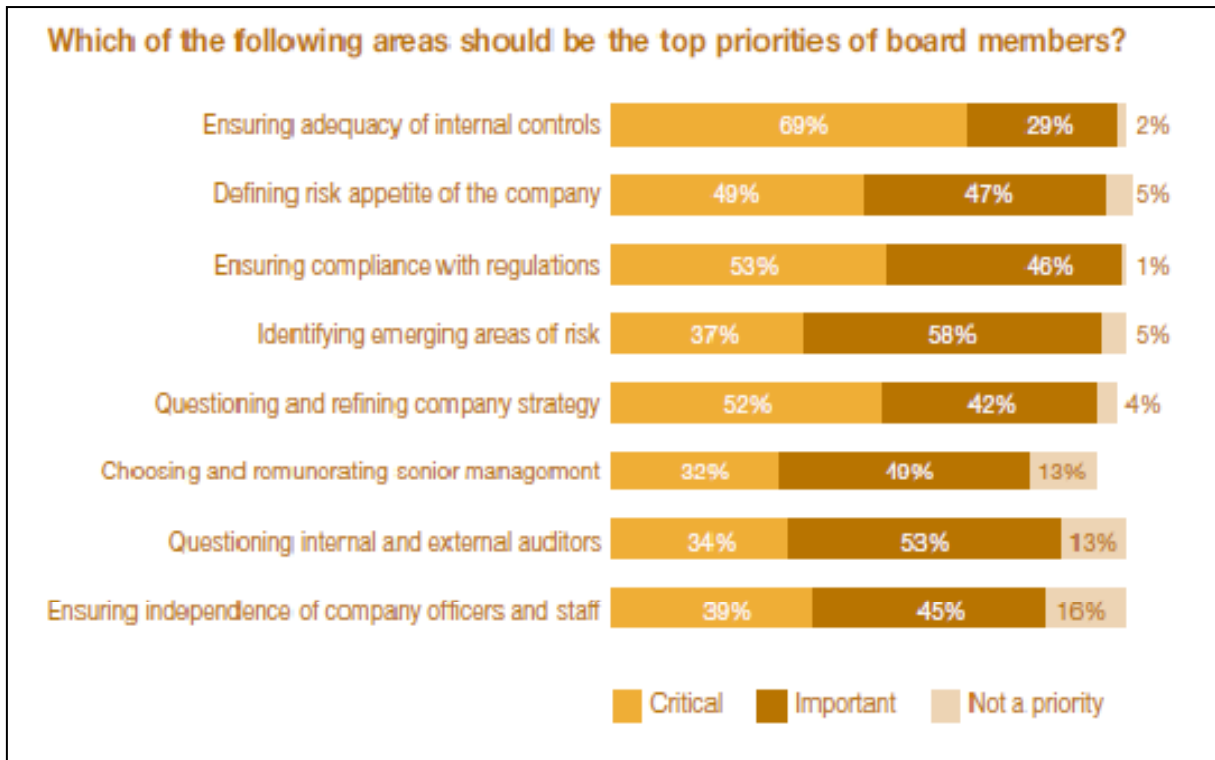
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- The monitoring and support of risk management practices
- Comprehensive reporting to the executive committee, the board sub-committees and the board of directors

The ALM is responsible for monitoring daily interest rate repricing and reporting to both ALCO and RMC. The forecast of interest rate sensitive asset and liability scenarios are used to monitor the impacts of interest rate gaps on the NII. The IRR monitoring includes banking performance and trends, market interest rate forecasts, and yield curve expectations. Reports contain one or more risk management strategies and interest rate forecasts. The reports are periodically sent to the ALCO and the RMS (Mercantile Bank, 2007).

While fluctuations in NIMs could be an important risk factor that impact on the banks' profitability, changes in interest rates were less likely to worsen the banks' financial performance through their effects on the NIM. From 1979 to 1999, banks in Australia, Canada, Germany, Italy, Japan, Norway, Sweden, Switzerland, the USA and the UK successfully limited the exposures of NIMs to changes in market interest rates. The relatively stable outcomes reflect in part the shorter-term business focus of the commercial banks in many countries relative to that of the building societies, thrifts and the other banking organizations. Results are consistent with banks that control IRR through the selection of assets and liabilities, the setting of rates on core deposits and retail loans, and hedging activities (English, 2002).

Figure 5.3 below illustrates the top three areas of risk governance and the risk governance process. These aspects ensure the adequacy of internal controls, compliance with regulations and the adjustment of the bank's business strategy.

Figure 5.3 Internal Governance and Processes

Source: PWC (2008d, 13)

9. RISK AGGREGATION AND CAPITAL ALLOCATION

To assess capital requirements, the majority of banks in the world have developed internal models based on their risk profiles and business strategies. Both quantitative and qualitative methods are employed to assess the economic capital. The Basel Committee recognized that economic capital determines the long-term soundness of banks through its relation with the banks' risks. Banks should evaluate the adequacy of the internal capital and future capital requirements. Economic capital requirements are assessed based on risks born by each business unit and by the products of banks. Internal capital levels have to comply with minimal regulatory requirements set by the Basel Committee as well as the regulatory body in each country. The capital levels of banks are determined by taking into account risks that originate from all banking activities.

Risk exposures are aggregated at the head-office level of banks. Different types of risks are summed up and measured by different methods throughout the world. The most commonly used approach is RaRoC. RaRoC allows all business units in banks to be assessed equally.

Each type of risk exposure is measured by VaR for expected and unexpected losses. RaRoC functions through matching revenues, costs and risks at individual transaction or portfolio level during a predefined period of time. To achieve the goal of RaRoC, the first step is to differentiate between expected and unexpected losses. The expected losses are losses that are covered by banks' capital reserves and provisions. The unexpected losses are covered through capital allocation that is determined by confidence level, time horizon, diversification and correlation (Santomero, 1997).

The RaRoC measures risks by assessing the volatility of incomes. Return distributions with standard deviations are also estimated. Capital is allocated to each activity according to the volatility measure of incomes. Risky positions are obliged to provide the expected rates of returns on allocated capital. This is to compensate banks for additional risks brought in by each new risky activity. Therefore, risks are aggregated and priced after all risks have been evaluated through loss distribution. Capitals are allocated to risks based on loss distribution.

An alternative approach to the VaR and RaRoC, called the EaR, relies more on cash flows or earnings volatility than capital allocations. Return distribution based on the historical data can be estimated for each type of risk such as the IRR. The extreme result can be estimated through the tail of the distribution. Banks can then set risk limits for potential future losses through taking a certain percentage of past or current income or market value. The EaR approach looks at the direct impact of a risky position on the current earnings of banks as opposed to the indirect impact a risky position has on the economic value of banks through the economic capital. The EaR approach focuses on changes in earnings and cash flows rather than the economic value of assets and liabilities of banks when market interest rates change. One of the disadvantages of this approach is that EaR measures risks based on the subjective lists of risky events to determine the worst case scenario of earnings losses (Santomero, 1997).

The PWC risk management survey (2002) found that a broader and more accurate risk aggregation across all portfolios and business units could improve risk quantification tools (PWC, 2007: 6). PWC (2007) again reinforced risk aggregation issues in its quarterly journal (entitled *The Journal*) by pinpointing the underlying reason that there is not adequate risk management infrastructure to aggregate across the different types of risks. Due to the current shortcoming of basic risk management systems and data aggregation, ninety three per cent of

respondents stated that integrating legacy systems and databases are expected to remain the main challenges until 2011. Until then, banks are expected to redesign and rebuild their risk management systems and data management infrastructure (PWC, 2007: 8).

In the next section, the management approach specific to the banking book IRR is discussed.

10. MANAGEMENT OF IRR IN THE BANKING BOOK

Having discussed market risk management principles and practices in previous chapters, it has shed some light on systems and management aspects important for this study. This section focuses specifically on banking business IRR, where issues of the board and senior management responsibilities in overseeing banking business IRR, adequate policies and procedures in banking business IRR management as well as internal control functions are briefly explained. This section is a summary of the extract and adaptation from the paper “Principles for the Management and Supervision of Interest Rate Risk” issued by the Basel Committee on Banking Supervision. The following principles selected from the above-mentioned paper relate corporate and risk governances to the IRR management process which includes identification, measurement, mitigation and monitoring and reporting. This information will be a useful guide for the SIRR management process to be developed in this study.

10.1 Board and Senior Management Overseeing of IRR

Board and senior management reviews should be conducted regularly and carried out more frequently where the bank holds significant positions in complex instruments. The following describes the overseeing principles for the board and senior management of the bank.

- The board of directors is responsible for approving the IRR measurement PPS and ensuring that senior management monitors and controls IRR in a manner that is in line with the board’s approved PPS. The IRR exposure should be periodically (usually quarterly) communicated to the board of directors that assess the review procedure and evaluate the bank’s risk tolerance level.
- It is senior management’s responsibility to align the banking business structure with the IRR limit over time. The appropriate PPS should be in place to control and

maintain IRR exposure within limits with sufficient resources available to support such evaluation and control measures.

- Banks should ensure a separation of duties in key steps of the IRR management process to ensure objective execution. The process should also be separated from the individual business units of the bank. The individuals and/or committees involved in the IRR process should directly report to senior management and the board of directors. An independent unit should be established for a larger or a more complex bank to design and administer the IRR measurement, monitor and control functions.

10.2 Adequate Risk Management Policies and Procedures

It is important that the PPS defines a framework within which the bank manages risk. This framework will assist employees at all business and management levels of the bank to have a clear understanding of risk management processes and functions. Therefore, the PPS should be developed to clarify the nature of businesses and define risk appetite and tolerance levels of the bank. The PPS should be well-documented and communicated effectively to guide the construction of risk management processes, particularly the key steps such as identification, measurement, mitigation and monitoring and reporting within the process. The following highlights the important features of IRR PPS.

- The IRR PPS should be defined in a manner that is consistent with the bank's strategic direction and business activities.
- The PPS should be consolidated and implemented for the bank as a whole and can also be applied at the individual business unit level as well.
- In the case of new product launches and new activity initiatives, the adequate PPS should be in place before new products are introduced and new activities are undertaken.

10.3 Internal Control

Internal control is a process initiated by the board of directors, senior management and all levels of personnel. It is not solely a procedure or policy that is performed at a certain point in time, but rather it is continually operating at all levels within the bank. The board of directors

SIRR Management Process of Commercial Banking

and senior management are responsible for establishing an appropriate culture to facilitate an effective internal control process and for monitoring the effectiveness of the internal control process on an on-going basis. However, each individual within an organisation must participate in the process. The main objectives of the internal control process can be categorised as follows:

- A performance objective that ensures efficiency and effectiveness of business activities.
- An information objective that strives towards reliability, completeness and timeliness of financial and management information.
- A compliance objective that aligns with applicable laws and regulations.

Internal control consists of five interrelated elements which include:

- Management overseeing and control culture,
- Risk recognition and assessment,
- Control activities and segregation of duties,
- Obtaining and communicating information, and
- Monitoring activities and correcting deficiencies.

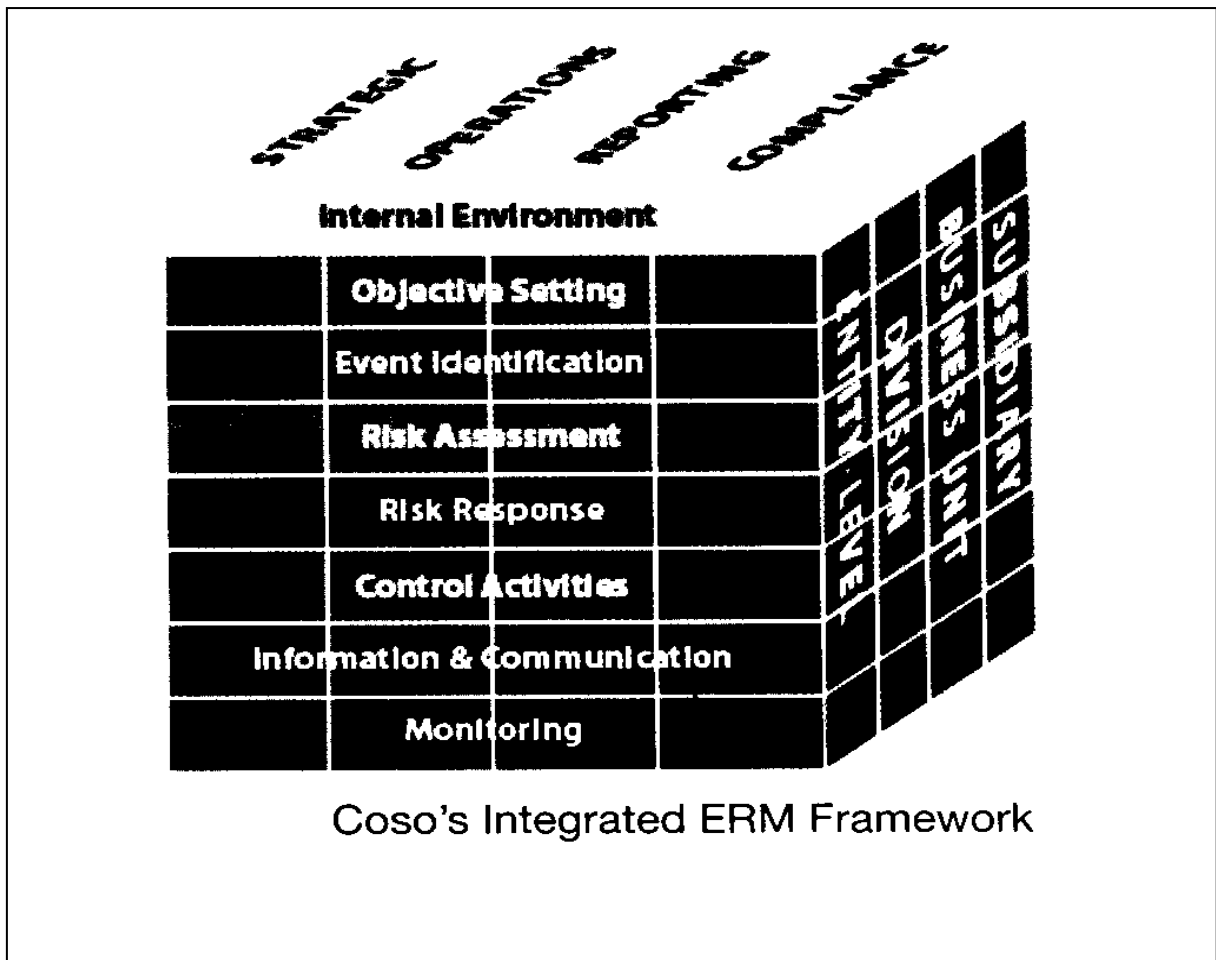
Internal control elements facilitate the achievement of performance, information communication as well as the compliance objectives of the internal control process. More importantly, the effective achievement of internal control objectives may lead to an effective control over the performance of the risk management process.

PWC (2007) stated that COSO over a decade ago issued the Internal Control Integrated Framework to help businesses and the other entities assess and enhance their internal control systems. A project was initiated which engaged PWC to develop a framework that would be readily usable by management to evaluate and improve their organizations' ERM. Although it is not intended to replace the Internal Control Integrated Framework, companies may decide to look to the framework to satisfy their internal control needs and to move towards a more

comprehensive risk management process.

As illustrated in Figure 5.4 below, the COSO’s integrated ERM framework has a top-down structure which starts from objective setting at the top and then flows down to event identification, risk assessment, risk response, control activities, information and communication and monitoring. This process is incorporated into all business levels ranging from subsidiary, business unit, division to individual transaction level. Within each step, there is an internal environment which consists of strategy, operations, reporting and compliance. Moreover, it also indicates how the mission and objective of the bank are related to risk appetite and tolerance.

Figure 5.4 COSO’s Integrated ERM Framework



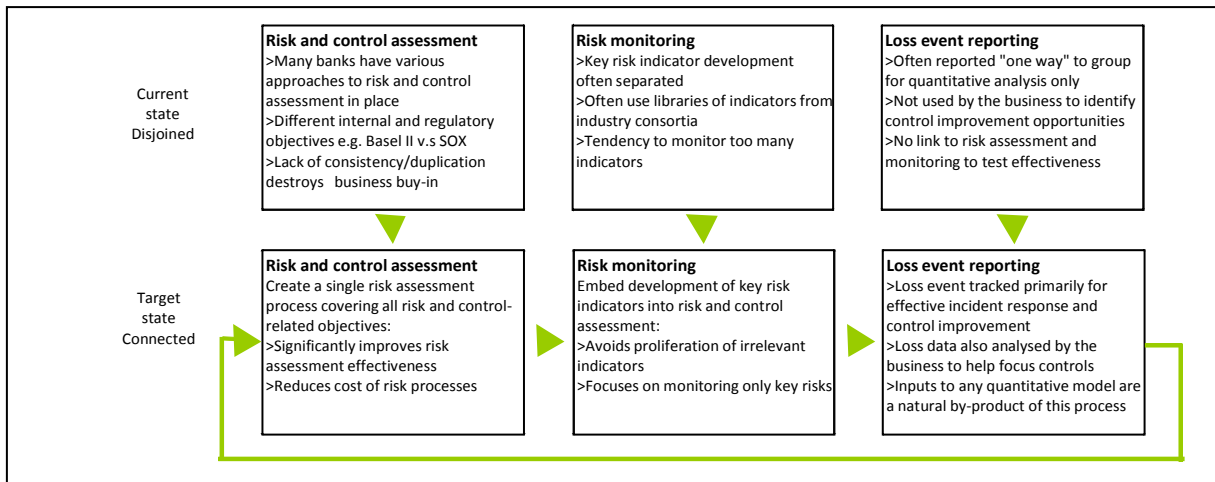
Source: Fadul & Catherine (2007)

Principle 10 in the paper “Principles and Supervision of Interest Rate Risk” deals with the internal control system of the bank. The paper states that the bank should put in place an

adequate internal control system to monitor the IRR management process. Internal control functions should include regular independent reviews and evaluations of the system and ensure that the possible improvement of the internal control system can be made if deemed appropriate. The review results should be communicated to the supervisory authorities when requested. The effective system of internal control for the IRR should include a strong control environment, an adequate process to identify and evaluate risk, the establishment of control actions such as PPS, adequate information systems and the continuous review of adherence to existing PPS. In addition, for those instances where the independent review is conducted by the internal auditors, banks are encouraged to have risk measurement, monitoring, and control functions periodically reviewed by external auditors. This does not have to involve a full replication of the internal audit process.

The current IRR management process in the South African banking sector may have to be improved in certain areas. PWC (2008a) stated that key risk indicators are often insufficiently linked to underlying risk assessment so as to provide effective risk monitoring. As shown in Figure 5.5 below, the most effective way to achieve effective monitoring is to establish links that are often absent between risk processes in many current risk management frameworks which enable them to work together in a dynamic risk management cycle rather than separate processes as is the case in many institutions. This brings operational risk closer to the approach adopted in credit and market risk in which forward-looking assessments are used to develop metrics for monitoring and then are back-tested against loss experiences. By creating these links, banks can create a self-improving and dynamic operational risk framework (PWC, 2008a). Operational risk is beyond the research scope of this study.

Figure 5.5 Creating Links between Operational Risk Processes



Source: PWC (2008a)

The business environment in which financial risk is created is becoming more complex every day. This implies that systems have to be updated regularly. The current problem of unlinked stages of the process in South Africa needs to be taken into account as a potential risk source because it ignores the interconnectedness of different bank processes or risks. The process to be developed in this study is to address the specific research problem that is related to the SARB inflation targeting policy. It seems that such processes are currently still nonexistent in the South African banking sector.

Table 5.3 summarises techniques in the risk management process of major banks globally.

Table 5.3 Summary of Stages of IRR Management Process and Techniques

Stages of Risk Management Process	Techniques
Risk Identification and Prioritization	Questionnaire, interview, regression analysis, risk survey, risk workshop, external risk scanning and risk index
Risk Measurement	
Trading IRR	VaR, stress-testing and back-testing
Banking IRR	EaR, VaR, maturity GAP, repricing GAP, duration GAP, sensitivity, static simulation and dynamic modelling
Risk Mitigation	FRA's and swaps are mostly-used hedging instruments. Others include options (including caps and floors) and futures
Risk Monitoring	
Trading IRR	Risk limits
Banking IRR	GAP sensitivity analysis
Risk Reporting	The reporting procedure follows closely the internal control, risk governance and ERM framework of the bank and ALM unit. Risk desks report daily to the risk manager of each business unit. The business unit risk manager reports weekly to the head of the ALM unit. The ALM unit reports monthly to ALCO. ALCO reports quarterly to the board of directors

11. THE INTEREST RATE RISK MANAGEMENT SYSTEM

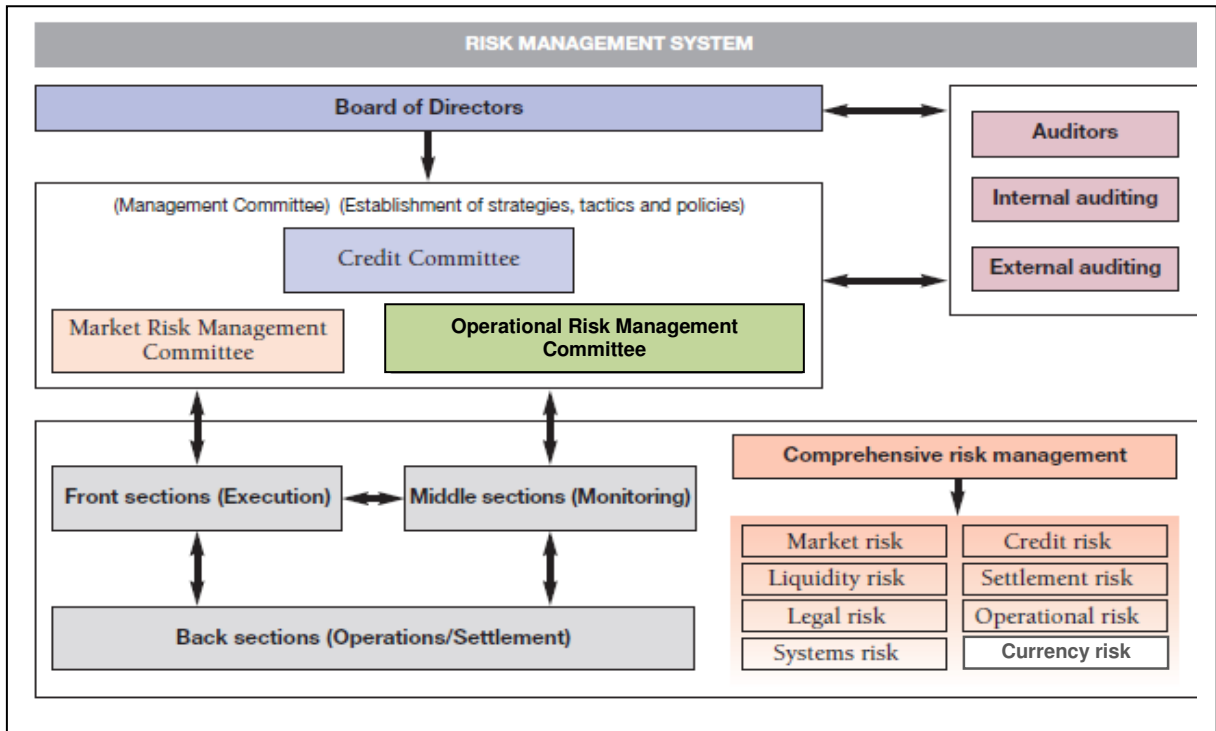
Banks choose to manage certain risks for a couple of reasons. The standard economic theory argues that bank risk managers aim to maximise expected returns regardless of the variance around their expected values. Other reasons for banks to manage risks include managerial self-interest, non-linear tax structure, financial distress costs and imperfect capital markets. Any of these reasons justifies the bank's concern over return variability (Santomero, 1997: 5). These issues are addressed in this section.

11.1 Bank Risk Management System Overview

In this section, the bank risk management system is reviewed and illustrated through a diagrammatic approach that incorporates current practices in leading banks globally.

As illustrated in Figure 5.6 below, the main building-blocks of a banking risk management system include the board of directors, risk management committees, individual business sections and the risk-auditing unit. There are three major risk management committees that oversee credit risk, market risk and operational risk. The board of directors is responsible for approving risk management strategies, tactics and policies developed by risk management committees. Internal and external auditors monitor the activities of the board of directors and risk management committees. Risk management committees implement board-approved risk management strategies, tactics and policies through front, middle and end sections which are interconnected with each other. All three business sections manage major risk types such as market, credit, liquidity, currency and operational risks within each business unit.

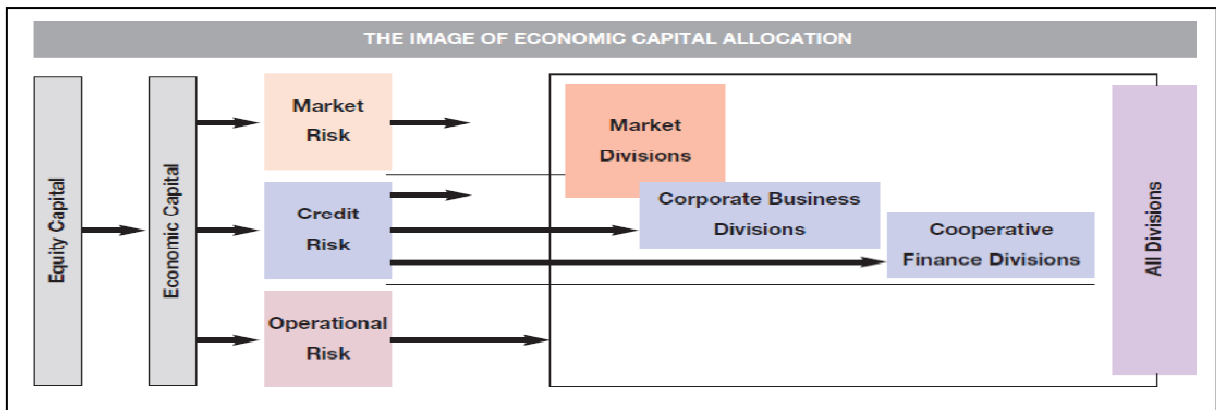
Figure 5.6 Bank Risk Management System



Source: Norinchukin Bank (2005, 38) (Adapted)

Figure 5.7 below shows that the equity capital is allocated through the economic capital approach. The economic capital is subsequently allocated to three major risk categories including market risk, credit risk and operational risk. All divisions and units of the bank such as market divisions, corporate business divisions and cooperative finance divisions are allocated capitals under each risk category.

Figure 5.7 The Image of Economic Capital Allocation



Source: Norinchukin Bank (2005, 38)

Oldfield and Santomero (1997) argued that risks facing banks are categorised into three groups. From a management perspective, these risk categories are:

- Risks that can be eliminated or avoided by simple business practices

Risk avoidance involves techniques to reduce the probability of financial losses from banking activities by eliminating risks that prevent banks from achieving their business objectives. There are three common risk avoidance practices. The first one is the standardization of processes, contracts and procedures to avoid inefficient or incorrect financial decisions. The second one is the construction of portfolios that benefit from the diversification effect across borrowers, and that reduce the effect of financial losses. Lastly, risks are eliminated through the implementation of incentive contracts with management who will be responsible for their risk-taking activities (Santomero, 1997: 3).

- Risks that can be transferred to third parties

There are risks that can be reduced through the technique of risk transfer. IRR is transferred through derivative instruments such as swap and forward contracts. Borrowing terms can be altered to adjust the duration measure of IRR. The bank can buy or sell financial claims to diversify or concentrate risks that result from servicing its clients. Unless the bank has a comparative advantage in managing such risks, it is more efficient to manage total risks through risk transferring (Santomero, 1997: 4).

- Risks that must be actively managed at the bank level

There are two classes of assets where risks inherent in banking businesses must be absorbed at the bank level. The first class includes financial assets or activities where the nature of embedded risk may be complex or difficult to communicate to third parties and thereby to transfer such risks. For instance, the bank may have complex and proprietary assets with inactive secondary market. The second class includes proprietary positions that are accepted because of high expected returns relative to risks. These risk positions are absorbed due to the fact that they are central to the bank's business. One example is the trading market risks to which the bank is exposed. In general, risks are absorbed, monitored and managed efficiently in order to

SIRR Management Process of Commercial Banking

achieve the bank's business objective and desired financial target (Santomero, 1997: 4).

Santomero (1997) stated that the bank risk managers follow an order of four steps to implement a large-scale risk management system. The steps are:

- Standards and reports,
- Position limits,
- Investment guidelines, and
- Incentive contracts and compensation.

These steps are applied to each risk type to which banks are exposed. For the banking sector as a whole, risks can be broken down into six generic types namely: market risk, credit risk, counterparty risk, liquidity risk, operational risk and legal risk (Santomero, 1997: 5-8). Risk management has long been treated as the control function to manage four types of risks namely: credit risk, IRR, foreign exchange risk and liquidity risk. The four-step risk management process mentioned above is adapted to each risk type so as to standardise, measure, constrain and manage these risks (Santomero, 1997: 11).

The bank risk management system involves major risk management processes dealing with credit risk, IRR, foreign exchange rate risk and liquidity risk. Other risks such as operational, legal, regulatory, settlement and system risks are not yet addressed in any formal and structured way. Basel II recommends principles and guidelines for operational risk management. However, the operational risk management system is in the process of development.

The remaining part of the section is devoted to present an overview of the risk management processes of the four major risks mentioned above. Section 11.2 discusses the IRR management process in detail.

The credit risk management process is a qualitative review of the performance potential of different borrowers. It results in a rating, periodic re-evaluation at reasonable time intervals and the on-going monitoring of various measures of risk exposures. Foreign exchange risk is

monitored on a real time basis with risk limits. The effects of adverse rate movements are simulated through unit changes of exchange rates and/or historical distributions. Liquidity risk is managed as a planning exercise, although the analysis of the funding effect of adverse news is necessary in some cases. Lastly, IRR is measured, usually weekly, using on- and off-balance sheet exposures. Positions are reported in repricing terms through GAP, effective duration and simulation techniques. Risk limits are established and synthetic hedges are deployed on the basis of cash flow forecasts (Santomero, 1997: 22).

11.2 IRR Management System

The risk management techniques reviewed in this section are not average practices, but techniques used by banks at the higher end of the banking industry globally. The risk management approaches in smaller banks, as well as larger but relatively less sophisticated ones, are less precise and analytic. In some cases, these risk management approaches require upgrading to reach the level of those discussed in this section.

The majority of commercial banks distinguish between trading and banking interest rate exposures. Trading IRR management systems vary from bank to bank. In large banks, VaR models are the standard approach whereas simple risk limits and close monitoring are used by banks that have a low level of trading activities (Santomero, 1997: 16).

For banking book IRR, commercial banks tend not to use market values, risk management guidelines or risk limits but cash flows and book values. Asset cash flows are reported in various repricing schedules in the “interest rate sensitivity GAP report”. Figure 5.8 below shows the repricing profile of the banking book balance sheet and indicates that assets reprice quicker than liabilities. This system is named as the “GAP reporting system” since the repricing of assets and liabilities results in a gap. The gap is measured in terms of ratio or percentage mismatch over a standardised time interval, such as a 30-day or one-year period (Santomero, 1997: 16-17).

Figure 5.8 Interest Rate Repricing GAP Analysis

Interest Rate Repricing GAP								
Rand Million	2006						Trading and non-rate	Total
	< 3 months	3-6 months	6 months - 1 year	1-5 years	> 5 years			
Total assets	297917	3975	4951	24676	10751	82642	424912	
Total liabilities and shareholders' funds	241207	15179	30344	7961	2097	128124	424912	
Interest rate hedging activities	3582	6859	6730	(10564)	(6607)	-	-	
Repricing profile	60292	(4345)	(18663)	6151	2047	(45482)	-	
Cumulative repricing profile	60292	55947	37284	43435	45482	-	-	
Expressed as a % of total assets	142	13.2	8.8	10.2	10.7			

Source: Nedbank (2006, 132)

The GAP reporting system is sometimes supplemented with duration analysis as illustrated in Figure 5.9 below. Asset categories that do not have fixed maturities, such as prime overdraft rate loans, must be assigned a duration measure based upon actual repricing flexibility. A similar problem exists for core liabilities, such as retail demand and savings deposits. However, the banking industry attempts to measure these estimates accurately, and include both on- and off-balance sheet exposures in the reporting procedure. The result of this exercise gives an approximate measure of the duration GAP (Santomero, 1997: 17).

Figure 5.9 Duration Analysis of Interest Rate Risk Exposure

As of December 31, 1995 \$ Million	On Balance Sheet			Off Balance Sheet		Combined On & Off	
	Balance	Rate (%)	Effective Duration Years	Notional Amount ⁽¹⁾	Net Spread (%)	Adjusted Rate (%)	Adjusted Effective Duration
Variable rate prime loans	\$16 179.00	6.75	0.29	\$15 133.00	2.07	8.37	8.37
Other variable loans/investments	<u>14963.00</u>	7.00	0.19	<u>0.00</u>		7.01	0.19
Total variable rate assets	31 342.00	6.90	0.24	15 133.00	2.07	7.91	1.00
Fixed rate loans	27 899.00	9.64	2.19	58.00	-5.15	9.63	2.19
Other fixed investments	<u>12 259.00</u>	6.82	2.95	1 205.00	-1.49	6.67	2.82
Total fixed rate assets	40 148.00	8.78	2.42	1 263.00	-1.66	8.73	2.38
Other assets	<u>8 629.00</u>		1.34	<u>0.00</u>			1.34
Total assets	<u>\$79 919.00</u>	7.1	1.45	\$16 396.00	1.78	7.47	1.73
Liabilities							
Contractually repriceable	\$27 479.00	2.41	2.08	\$5 638.00	1.98	2.00	1.73
Variable borrowings	<u>10 250.00</u>	2.76	0.05	<u>198.00</u>	-8.90	2.93	0.08
Total variable liabilities	37 729.00	2.51	1.53	5 836.00	1.61	2.26	1.28
Total fixed liabilities	20 003.00	4.61	1.49	8 624.00	2.33	3.61	0.75
Non-interest bearing DDA	13 677.00		3.42	<u>0.00</u>			3.42
Total deposits/borrowings	71 409.00	2.62	1.88	14 460.00	2.04	2.21	1.54
Other liabilities	<u>1 476.00</u>		0.06	<u>0.00</u>			0.06
Total liabilities	<u>\$72 885.00</u>	2.57	1.84	<u>\$14 460.00</u>	2.04	2.17	1.51

Note: (1) \$5.6 billion of basis swaps are excluded from variable rate prime notional amounts, but included in effective duration calculations. Note that DDA stands for the Demand Deposit Account.

Source: Santomero (1997)

Banks realise that GAP and duration reports are static and do not give a full representation of

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the dynamic nature of the banking industry, where assets and liabilities change over time and spreads fluctuate. At present, many banks use the balance sheet simulation models to evaluate the effect of interest rate variation on reported earnings over one-, three- and five-year horizons. These simulations require informed repricing schedules, as well as estimates of prepayments and cash flows. In terms of repricing schedules, such analysis requires an assumed response function to rate movements. The pricing decisions of the bank are simulated for each rate movement. With regard to the measurement of prepayment and cash flows, simulations require precise prepayment models for proprietary products, such as middle market loans, as well as standard products, such as residential mortgages.

In addition, yield curve simulations are required over a presumed range of rate movements and yield curve shifts. When simulations are completed, the report shows the deviations of earnings corresponding to each rate scenario. Bank management sets risk limits under each scenario based on historical loss experiences, which are usually stated in terms of the deviation of earnings from expected values. Reports of these simulations are common in the banking industry as illustrated in Figure 5.10 below. Simulated results are compared with the risk limit in order to determine if risk exposures are acceptable. The EaR emerges as a common benchmark for the IRR measurement. However, the EaR adds limited value towards the risk measurement as it assumes a correct range of rates and an accurate response system. Nevertheless, the EaR is indicative of the effect of the underlying interest rate mismatch on the balance sheet (Santomero, 1997: 17-18).

Figure 5.10 Net Interest Margin Simulation

Net Interest Margins	Rate Scenario					
	Unchanged	+100 bps	+200 bps	Limit	-200 bps	Limit
12 Months Net Interest Income						
(a) W/Deposit rates unchanged from 9/94						
Total earning assets	\$1 577.00	\$1 560.50	\$1 540.80		\$1 545.40	
Net rate	32 892	32 912	32 420		32 346	
Change in net interest income	4.79(%)	4.74(%)	4.75(%)		4.78(%)	
Change in net interest income		-16.50	-36.20	+/-78.90	-31.60	+/-78.9
% Net interest income		-1.0(%)	-2.3(%)	+/-5.0(%)	-2.0(%)	+/-5.0(%)
(b) W/Deposit rates reflecting 50 basis point tightening in unchanged						
Total earning assets	\$1 551.00	\$1 560.50	\$1 540.80		1,45.40	
Net rate	32 892	32 912	32 420		32 346	
Change in net interest income	4.72(%)	4.74(%)	4.75(%)		4.78(%)	
Change in net interest income		9.50	-10.20	+/-78.90	-5.60	+/-78.9
% Net interest income		0.6(%)	-0.6(%)	+/-5.0(%)	-0.4(%)	+/-5.0(%)
Portfolio Equity						
Market value	\$5 727.00		\$5 241.00		\$6 109.00	
Change in market value			-486	+/-857	382	+/-857
% Shareholder's equity			11.1(%)	+/-20.0(%)	8.7(%)	+/-20.0(%)
Duration (years)	4.20		4.3		2.9	

Source: Santomero (1997)

Due to the potential loss exposures of simulations, treasury managers use cash, futures and swaps to reduce implied earnings risk. Every bank has an investment policy which defines the set of allowable assets and limits to minimise derivatives risks. The majority of banks restrict the activity of the treasury department by defining the set of activities it can employ to change the bank's interest rate position in both cash and forward markets. Some banks participate in derivatives transactions, but mainly employ instruments, such as swaps, caps and floors to prevent unexpected risk exposures. Therefore, the investment guideline becomes an essential tool to limit derivatives risks through measures such as allowable investment and hedging alternatives (Santomero, 1997: 18). The issue of the investment guideline is outside the scope of the study and will not be discussed further.

SUMMARY AND CONCLUSION

In this chapter, the bank risk management framework, structure and process are reviewed. These are key areas involved in bank IRR management. The four critical stages – risk identification, risk measurement, risk mitigation and risk monitoring and reporting – in the IRR management process are discussed. The discussion is extended with theoretical and empirical findings from both global and South African contexts. Risk aggregation and capital allocation are briefly explained as they become increasingly important areas in bank risk management but this topic does not fall within the scope of this study.

The banking book IRR management is discussed in detail concerning the risk management structure, policies, procedures and internal control issues. Areas for improving the creation of links between stages of the risk management process are identified. This reinforces the need of the development of a feedback loop process of IRR management as proposed in this study. Finally, the chapter ends with the IRR risk management system developed through a review of practices of leading banks globally.

CHAPTER SIX: EMPIRICAL FINDINGS AND THE PROPOSED FRAMEWORK

1. INTRODUCTION

The aim of this chapter is to demonstrate current risk management practices in the South African commercial banking sector. Survey questionnaires were used to identify potential gaps in risk management practices in the sector. The empirical findings will testify to the research problems addressed in the study that portfolio losses result from changes in the repo-rate. An initial framework is developed for the banking book SIRR process, incorporating areas for improvement in current practices.

The next section briefly describes all responding banks and provides an overview of the banking sector in South Africa. From section three to twelve, issues of risk management PPS, ERM framework, overall banking IRR management framework, bank risk management policy statement, risk identification and prioritization, risk measurement, managing financial risks, risk monitoring and reporting, capital management and risk aggregation, as well as USA subprime crisis and its impact on bank management are covered. In the last section, a generic framework process is proposed for the management of banking book SIRR.

2. OVERVIEW OF THE SOUTH AFRICAN COMMERCIAL BANKING SECTOR

The research survey was conducted between the last quarter of 2009 and the first quarter of 2010 through electronic questionnaires. The first section that was covered in the questionnaire was constructed to gain an overview of the size and origin of assets and liabilities in local commercial banks, and a profile of the respondents. This section serves to identify the size of fixed-rate loans, advances and floating-rate deposits contained in the subject portfolio.

2.1 Banks Registered in South Africa

The survey focused on fourteen banks registered in South Africa. Of the fourteen banks, ten responded with satisfactory results. Respondents include chief risk officers, head of risk management, ALM risk managers, balance sheet risk analysts and CFOs. Among the ten participating banks, there are four large banks, four medium banks and two small banks, in terms of the size of the balance sheet.

As small banks do not have sophisticated IRR management systems in place, some questions in the questionnaire are not applicable to them. All figures are based on the 2009 financial year end of each bank.

Table 6.1 List of Responding Banks

Responses received (Seventy one per cent)	Large Banks	Standard Bank Group Limited	
		FirstRand Group Limited	
		Nedbank Group Limited	
		Investec Limited	
	Medium Banks	African Investment Bank Limited	
		Teba Bank Limited	
		Capitec Bank Holdings Limited	
		Mercantile Bank Holdings Limited	
	Small Banks	GBS Mutual Bank	
		VBS Mutual Bank	
	No response (Twenty nine per cent)	Large Bank	ABSA Group Limited
		Medium Banks	Sasfin Bank Limited
Bidvest Bank Limited			
Grindrod Bank Limited			

Sixty per cent of participating banks are local banks, while the remaining forty per cent are local as well as international banks as they have branches and/or representative offices to serve their clients overseas. The shares of some are listed on two stock exchanges. An example is Investec Limited.

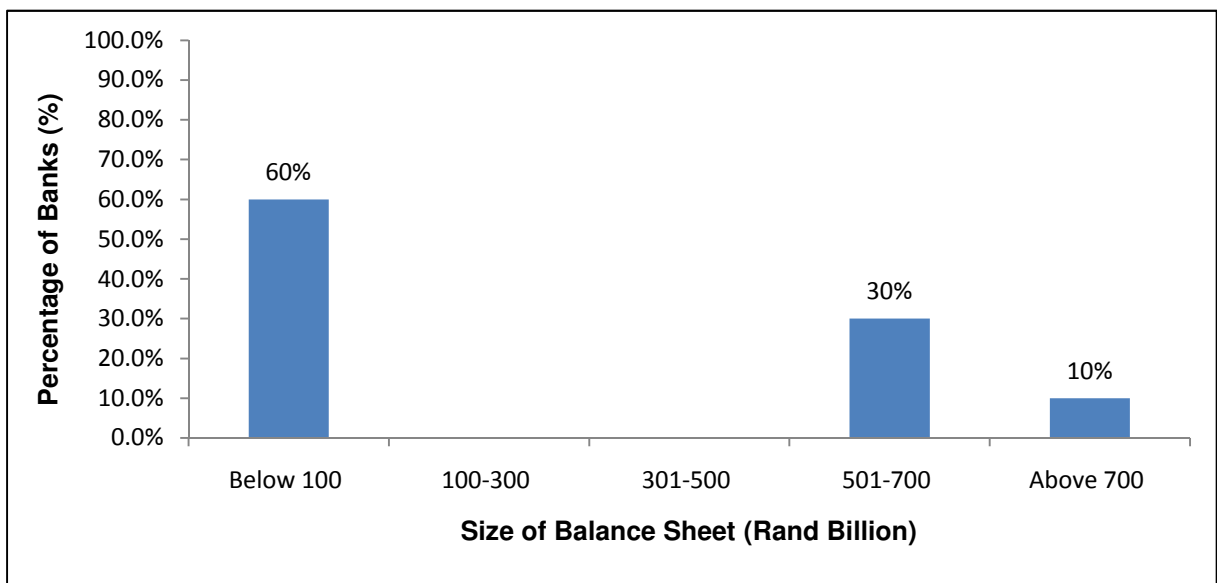
Respondents are involved in similar areas of bank risk management, including risk management policy design, risk management process implementation and risk control, risk capital management, risk auditing, and liquidity risk management. One respondent is

responsible for Information Technology (IT), compliance and board secretarial duties. One respondent takes part in the Basel II Internal Capital Adequacy Assessment Process (ICAAP).

2.2 Composition and Size of the Balance Sheet

As shown in Figure 6.1, respondents were asked to indicate the size of their balance sheets. In 2009, ten per cent of them had total assets of over R700 billion, thirty per cent had assets between R501 and 700 billion, while the remaining sixty per cent were below R100 billion.

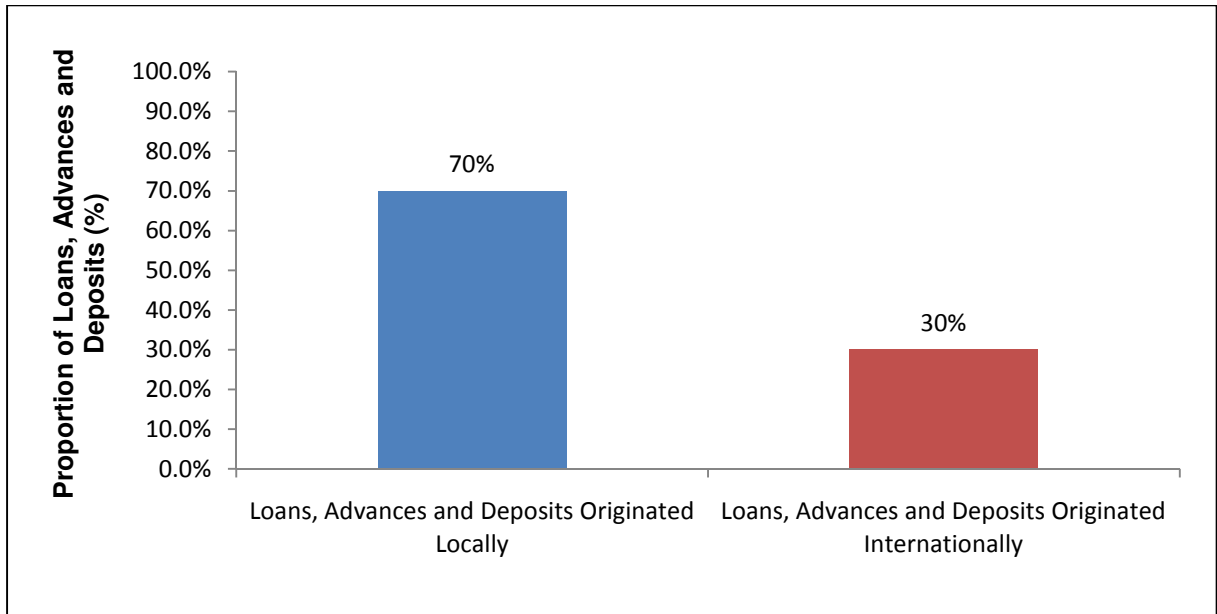
Figure 6.1 Size of the Balance Sheet



Note: All figures are rounded. The base year is 2009.

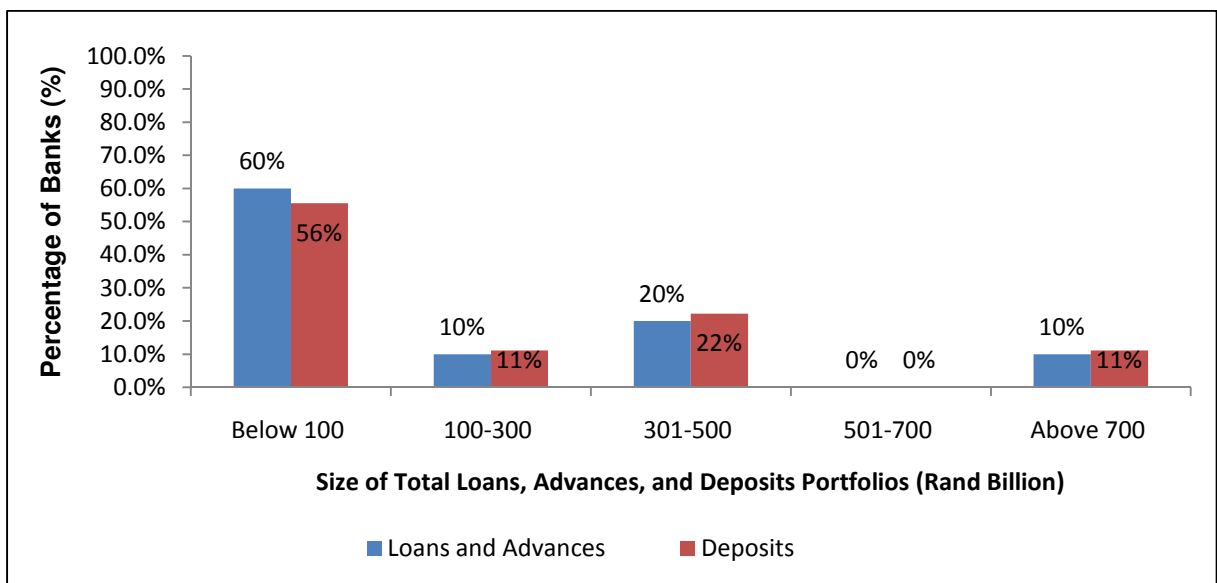
Respondents were asked to indicate the proportion of loans/advances as well as deposits that originated from South Africa. As shown in Figure 6.2, all banks have over seventy per cent of their loans, advances and deposits originating in South Africa.

Figure 6.2 Loans, Advances and Deposits Originating in South Africa



Note: All figures are rounded. The base year is 2009.

Figure 6.3 Size of Loans, Advances and Deposits Portfolios



Note: All figures are rounded. The base year is 2009.

Respondents were asked to indicate the size of their loans/advances and deposits portfolios. Figure 6.3 indicates that ten per cent of banks held total loans/advances of over R700 billion, twenty per cent held in the range between R301 and 500 billion, ten per cent was in the range between R100 and 300 billion, and sixty per cent held less than R100 billion. A similar

distribution for deposits can be seen except that there was a slightly lower percentage (fifty six per cent) of banks with a deposit size of less than R100 billion. This is because one bank was not involved in the deposit-taking business and their liabilities were used as funding deposits for providing unsecured credit to potential customers.

The next section discusses risk management PPS.

3. RISK MANAGEMENT POLICIES, PROCEDURES AND STANDARDS

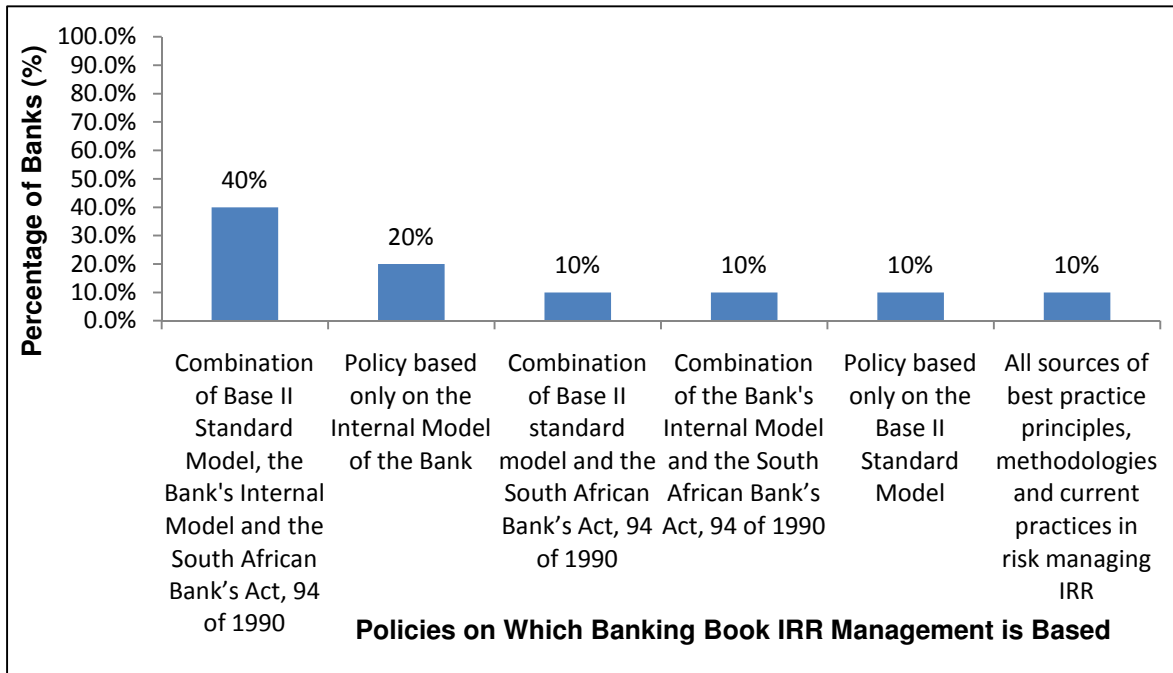
This section deals with risk management policies, tools, standards and procedures for banking book IRR. Risk management PPS is an important area of banking risk management as it guides the formation and implementation of policy statements, strategies and frameworks. These issues form the fundamental areas of bank risk management systems and processes.

3.1 Policy Formation

In a multiple-choice question, respondents were asked to indicate the sources on which their banking book IRR management policy is based. As illustrated in Figure 6.4, forty per cent of banks base their policies on a combination of Base II standard model, the bank's internal model and the South African Bank's Act, 94 of 1990.

Twenty per cent of banks base their policies solely on the banks' internal risk management model. Ten per cent of banks manage banking book IRR through a policy based on a combination of bank internal risk management model and the South African Bank's Act, 94 of 1990. Ten per cent of banks take into account all sources of principles, methodologies and best practices to formulate policies and manage banking book IRR. Small banks base their policies on internal models. Other banks' policies rely on either the bank internal risk management model or Basel II standard model.

Figure 6.4 Policy Formation



Note: All figures are rounded. The base year is 2009.

3.2 Elements of IRR Management System

Respondents were asked in an open-ended question to indicate what risk identification, risk measurement, risk mitigation and risk monitoring tools are used to manage banking book IRR. As illustrated in Table 6.2, banks have deployed various risk management tools, depending on their portfolio composition, risk monitoring and risk reporting procedures.

Table 6.2 Key Elements of IRR Management System and Its Implementation

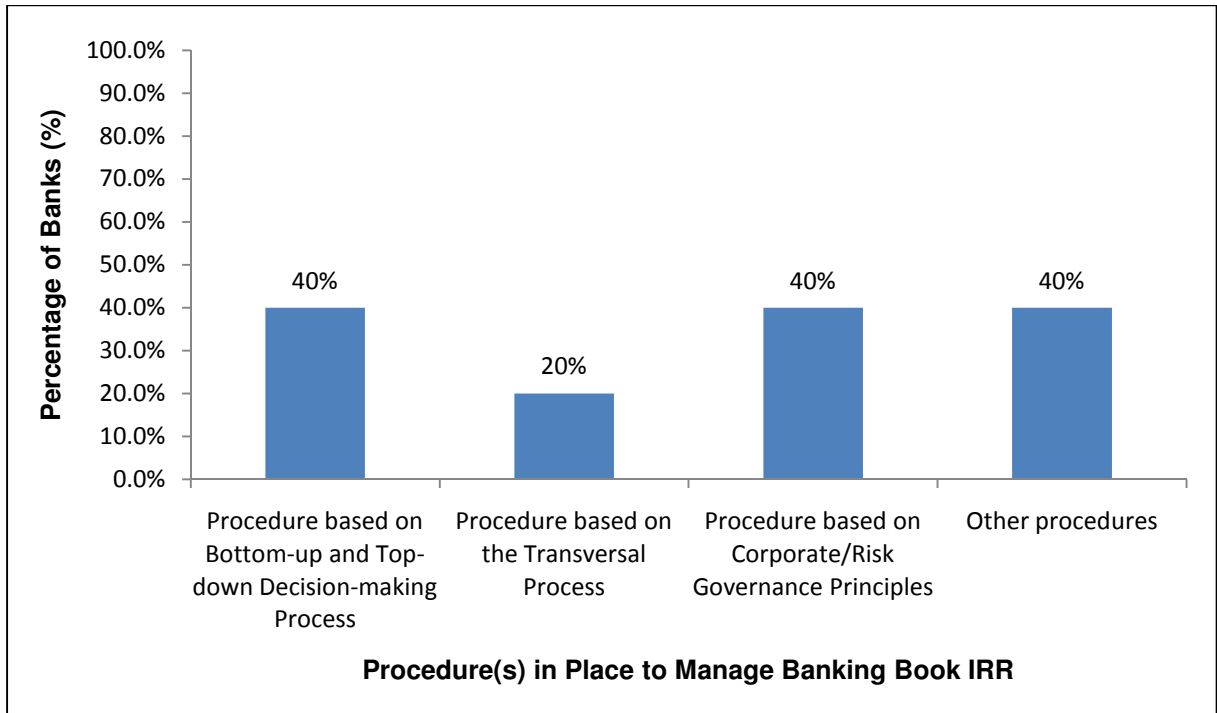
Respondent Banks (bank names are not mentioned for confidentiality reasons)	Key Elements of IRR Management System and Its Implementation
Bank One	NII sensitivity analysis, economic value of equity, GAP analysis, economic capital, swaps and swaptions
Bank Two	Risk simulation through software, and portfolio diversification
Bank Three	EaR and portfolio diversification
Bank Four	Risk is identified through contract data sets; Risk is measured through software covering earnings- and value-at-risk; Risk is mitigated through swaps, FRA's and currency matching; Risk is monitored through software reporting function
Bank Five	Risk is identified through analysis, discussion and other qualitative techniques; Risk is measured through stress-testing and "what if" scenario analysis; Risk is mitigated through formal ALCO meeting and corrective actions
Bank Six	Risk is identified through reviewing historical exposure and portfolio composition; Risk is measured through duration, repricing GAP and VaR analyses; Risk is mitigated through portfolio offsetting, and rate and maturity-matching techniques; Risk is monitored through comparison of actual results with predetermined risk limits; Risk is reported through governance structure linking business units, treasury and ALCO
Bank Seven	Risk is managed through formal discussion, analysis and brainstorming; The treasury environment is monitored on a daily basis and results are reported to ALCO
Bank Eight	Risk is managed through internally-developed risk management tools like self-assessment and software-based control measures
Bank Nine	IRR is managed through Risk Management Sub-Committee (RMSC) weekly meetings; Risks measurement through maturity structure analysis, and balance sheet and NII projection
Bank Ten	Specific risk management model is in place to deal with exposure to known risk factors

3.3 Risk Management Procedures

It has been shown that risk management procedures vary from bank to bank, as procedures are based on a combination of principles and practices. Respondents were asked in a multiple-choice question to indicate which procedures are in place to manage the banking book IRR. As shown in Figure 6.5, forty per cent of banks choose a procedure based on a bottom-up and top-down decision-making process, forty per cent base their procedures on corporate/risk

governance principles, and twenty per cent choose a procedure based on the transversal process. Other risk management procedures include funds transfer pricing (FTP), bottom-up measurement procedures and top-down policy and management procedures, the procedures of Risk Management Sub-Committee (RMSC), and the procedures of tying rates to those of large banks.

Figure 6.5 Procedure of Banking Book IRR Management



Note: All figures are rounded. The base year is 2009. Other risk management procedures include FTP, bottom-up measurement procedures and top-down policy and management procedures, the procedures of RMSC, and the procedures related to tying rates to large banks.

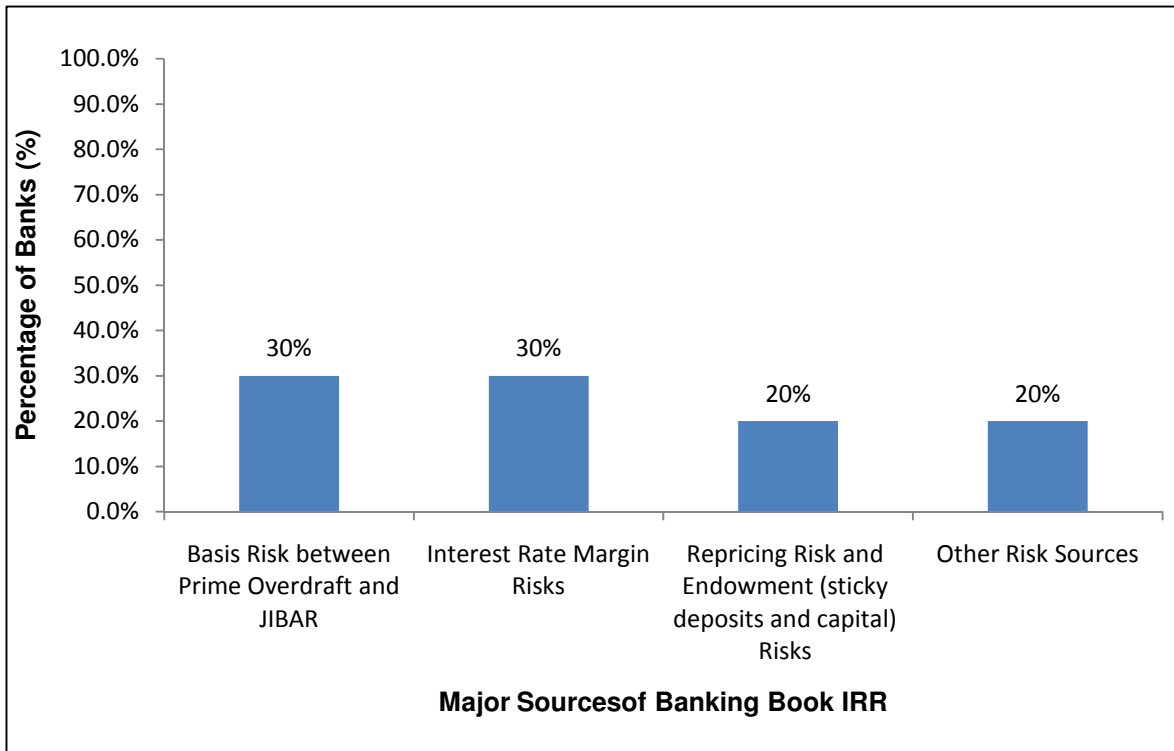
3.4 Major Sources of Banking Book IRR

Banking book IRR is often induced by the prime overdraft rate and JIBAR, to which balance sheet products are tied, causing repricing risk when rates change. IRR is also interrelated to other types of risks like credit risk and liquidity risk. All sources of risks will lead to the loss of NIM.

Respondents were asked in a multiple-choice question to indicate which aspects of banking book IRR are of vital importance for this type of risk. Eight respondents answered this question. Thirty per cent believe basis risk is due to assets and liabilities tied to the prime

overdraft rate and JIBAR respectively; Thirty per cent include interest rate margin risk, twenty per cent mention repricing risk, while twenty per cent mention endowment (sticky deposits and capital) risks as the major source of banking book IRR (See Figure 6.6). Other respondents also include call basis risk, fixed versus JIBAR risk, duration risk, credit management, and asset liability management.

Figure 6.6 Major Sources of Banking Book IRR



Note: All figures are rounded. The base year is 2009. Other risk sources include duration, call basis risk, fixed versus JIBAR risk, duration risk, credit management, and asset-liability management.

NIM management is a key management aspect in small banks, as their balance sheets are interest rate sensitive resulting in profitability risk. Small banks are usually not clearing banks, therefore their surplus funds are invested via large banks in a short-term product to ensure access to liquid funds.

3.5 Risk Management Standards

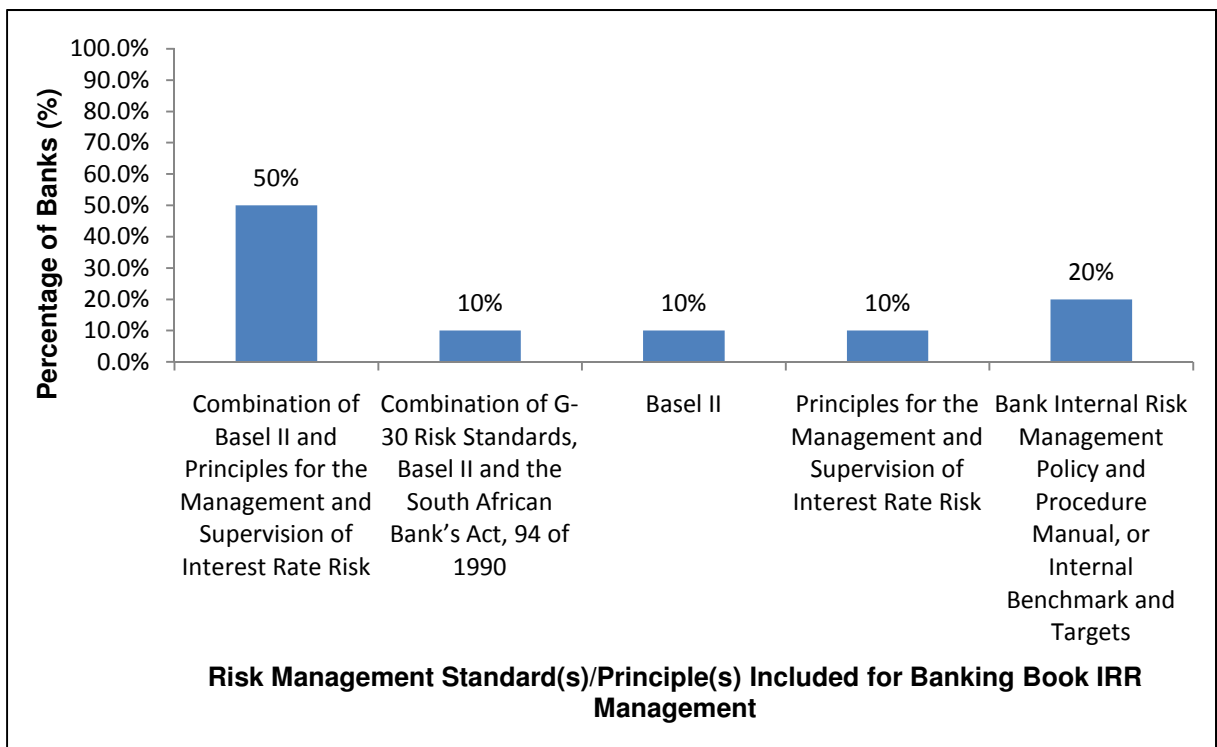
Respondents were asked in a multiple-choice question to indicate which risk management standards/principles are pursued for banking book IRR management. Most banks made use of international standards to form their risk management standards.

SIRR Management Process of Commercial Banking

As illustrated in Figure 6.7, fifty per cent of banks have referred to a combination of the “Principles for the Management and Supervision of Interest Rate Risk” and Basel II as the standards for banking book IRR management. Ten per cent refer to a combination of G-30 risk standards, Basel II and the South African Bank’s Act, 94 of 1990. Ten per cent refer to a combination of G-30 risk standards, Basel II and the South African Bank’s Act, 94 of 1990. Ten per cent refer to a combination of G-30 risk standards, Basel II and the South African Bank’s Act, 94 of 1990.

Even though the majority of banks refer to a combination of standards, ten per cent rely solely on Basel II, or the “Principles for the Management and Supervision of Interest Rate Risk”, while twenty per cent rely on the bank’s internal risk management policy, procedure manual, or internal benchmark and targets.

Figure 6.7 Risk Management Standards



Note: All figures are rounded. The base year is 2009.

In general, banks have developed their own risk management PPS, based on international principles, practices and standards or internally developed policies and benchmarks. The next section discusses the ERM framework, which forms the framework of the bank risk management system.

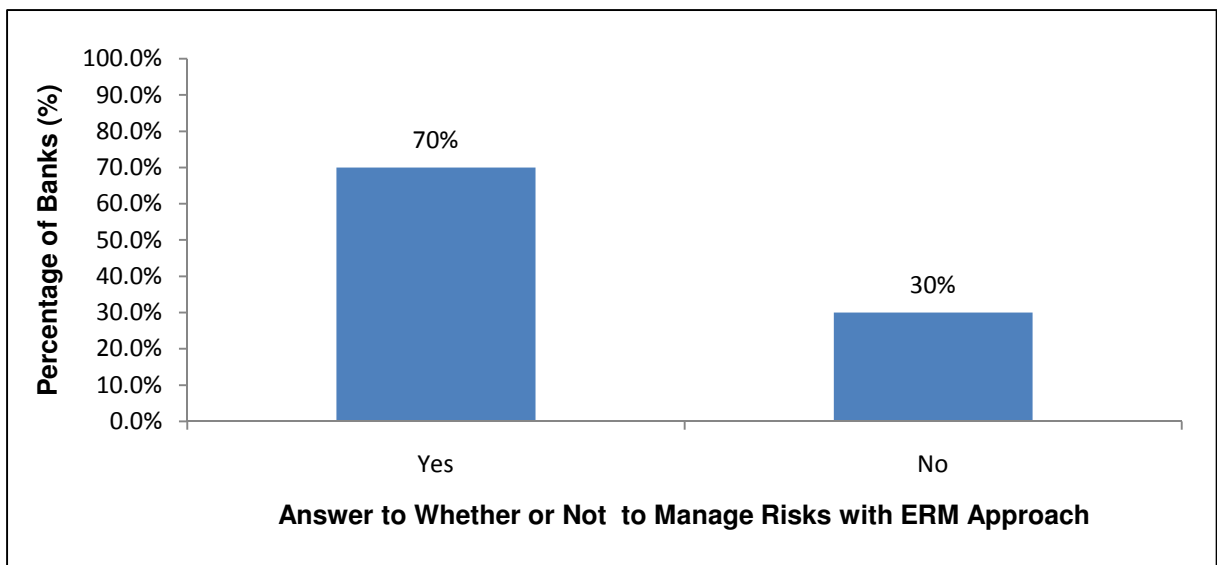
4. ERM FRAMEWORK

The bank risk management framework shapes risk management processes and reporting structures among different levels of bank management. In South Africa, a well-known ERM framework is applied with support of the King II corporate governance standards. Banks that have foreign operations also comply with corporate governance standards in the host country such as the Sarbanes-Oxley Act.

4.1 Risk Management Framework

Respondents were asked in a close-ended question to indicate whether the bank follows an ERM approach to manage risks. As illustrated in Figure 6.8, seventy per cent of banks are of the opinion that they have implemented an ERM framework to guide bank risk management.

Figure 6.8 Risk Management Framework



Note: All figures are rounded. The base year is 2009.

Among the remaining banks that have not yet put an ERM framework in place, one respondent explained that the bank adopted an ERM initiative, but the management of risk types is not centralized. Liquidity risk and banking book IRR are managed by an ALM unit that is not part of ERM. This bank has a separate department that manages the allocation of capital to each type of risk according to measurement results.

A silo-based framework is adopted in one medium bank, where banking risks are split into

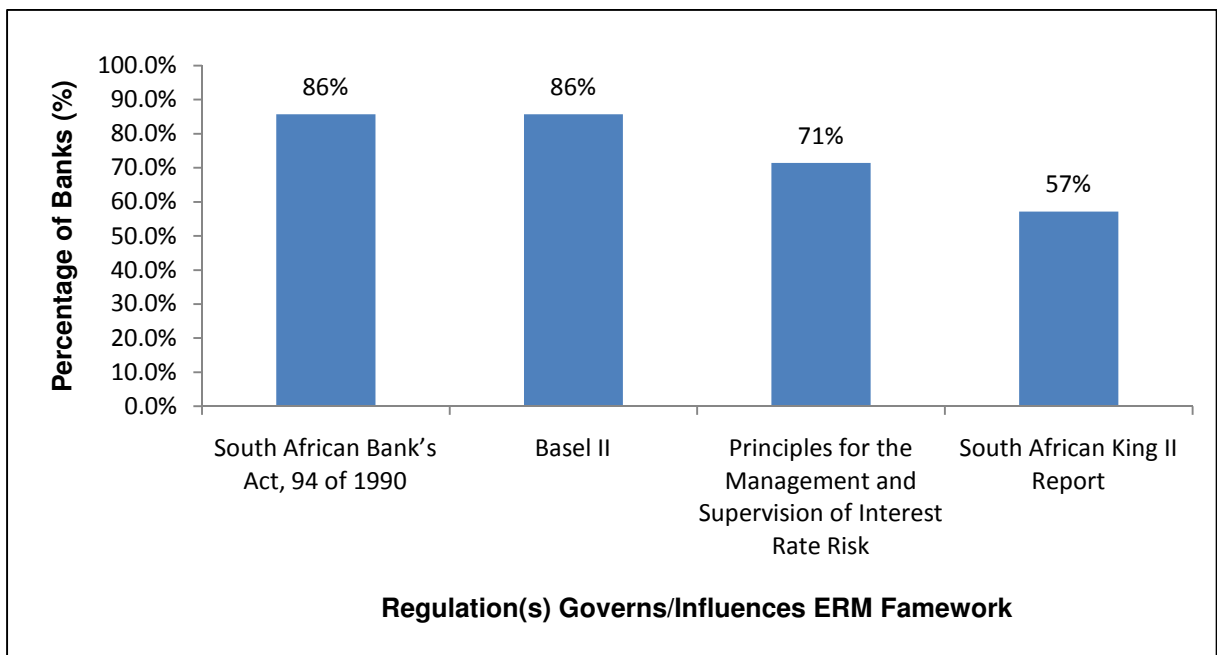
credit risk, trading market risk, balance sheet risk and operational risk, since the required management expertise and software vary from one risk discipline to another. The risk management function of a small bank is usually controlled by its RMSC.

4.2 Regulations Governing ERM Framework

Banks' ERM frameworks are governed or influenced by a combination of regulations and/or corporate governance standards locally and internationally. In a multiple-choice question, respondents were asked to indicate which regulation(s) govern(s)/influence(s) the ERM framework of the bank the most.

The South African Bank's Act and/or Basel II Accord, according to eighty six per cent of the banks, are the regulations that mostly govern the ERM framework, seventy one per cent use the "Principles for the Management and Supervision of Interest Rate Risk", and fifty seven per cent use the South African King II Report (See Figure 6.9).

Figure 6.9 Regulations Governing ERM Frameworks



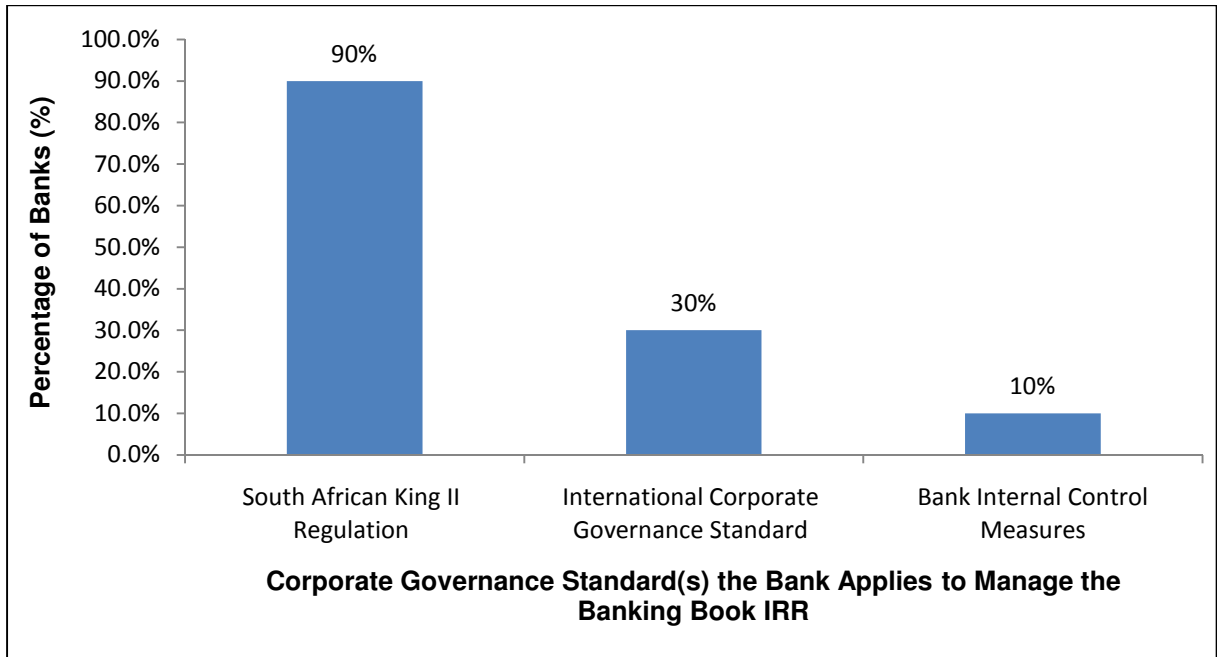
Note: All figures are rounded. The base year is 2009. The response of an individual bank may be included in more than one category.

4.3 Banking Book IRR Management

In a multiple-choice question, respondents were asked to indicate which corporate governance

standard(s) the bank applies to manage the banking book IRR. Figure 6.10 illustrates that ninety per cent of banks use the South African King II Regulation as the corporate governance standard that is applied to manage banking book IRR. International corporate governance standards are used by thirty per cent of the banks, while ten per cent only refer to the bank’s internal control measures.

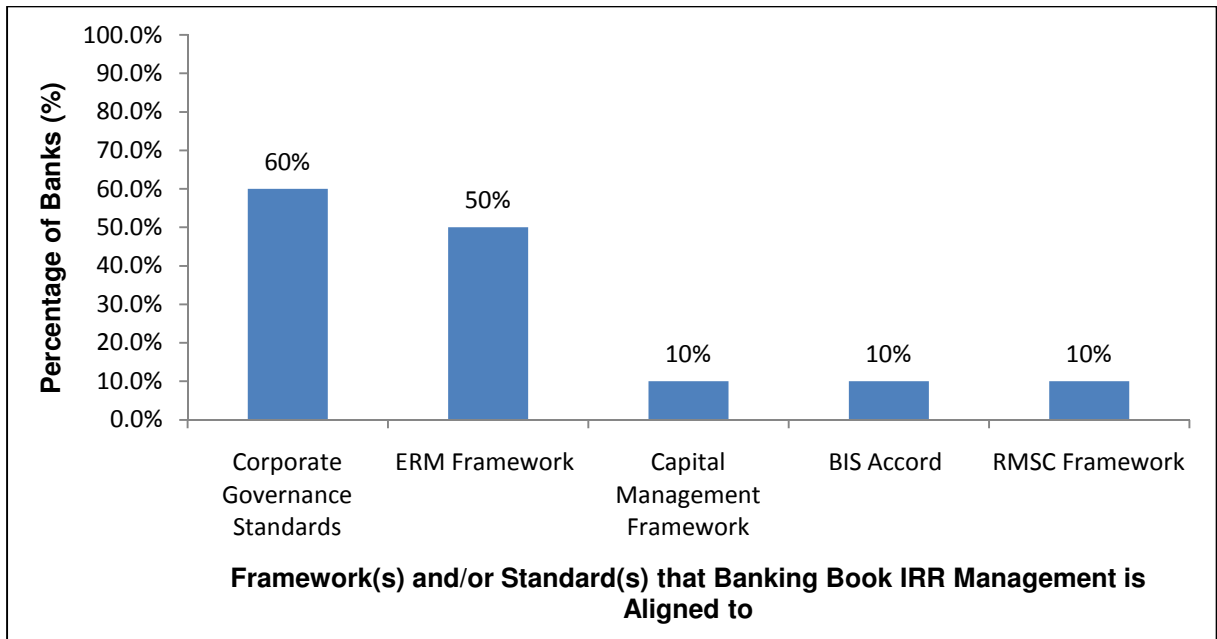
Figure 6.10 Corporate Governance Standard(s) Applied to Manage Banking Book IRR



Note: All figures are rounded. The base year is 2009.

In a multiple-choice question, respondents were asked to indicate to which framework(s) and/or standard(s) the bank’s ALM banking book IRR management is aligned. As illustrated in Figure 6.11, sixty per cent of the banks include corporate governance standards, while fifty per cent include the ERM framework to which risk management is aligned. Capital management framework, BIS Accord and the framework of RMSC were respectively used by ten per cent of the banks.

Figure 6.11 Framework(s) and/or Standard(s) that Banking Book IRR Management is Aligned to

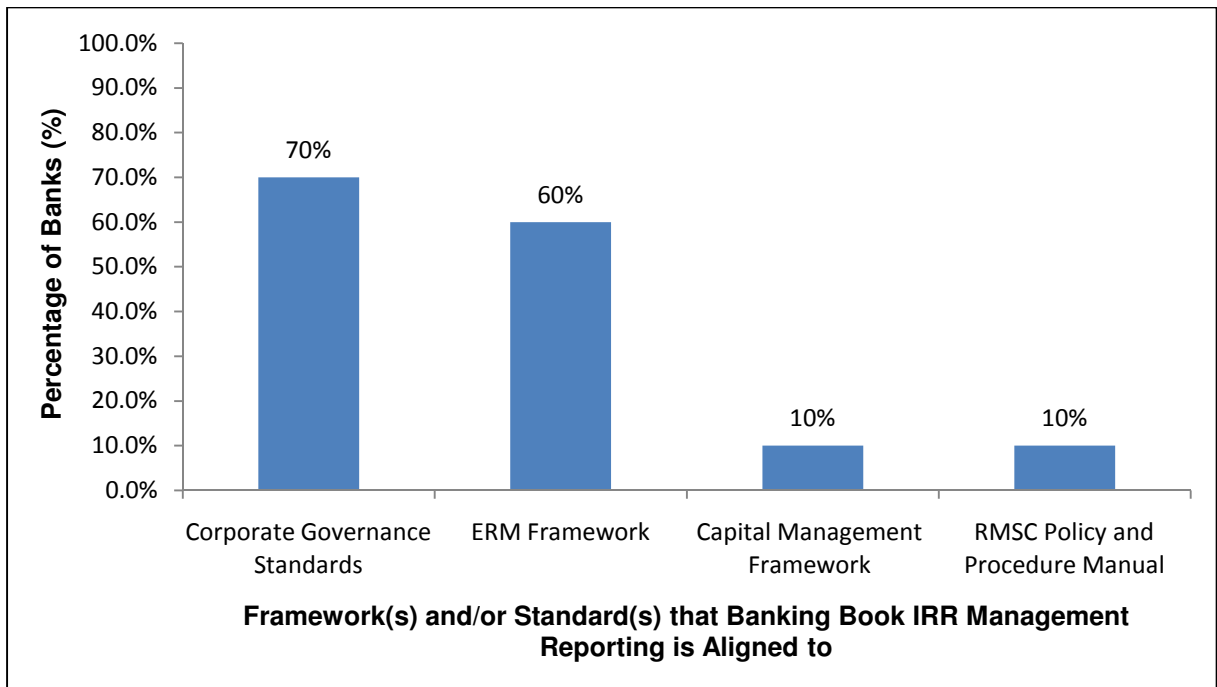


Note: All figures are rounded. The base year is 2009. The response of an individual bank may be included in more than one category.

In terms of risk reporting of banking book IRR management, respondents were asked in a multiple-choice question to indicate to which framework(s) and/or standard(s) the bank’s reporting line of banking book IRR management is aligned. Figure 6.12 illustrates that seventy per cent of banks choose corporate governance standards, while sixty per cent choose the ERM framework as one of the frameworks or standards to which the banking book IRR reporting line is aligned. The capital management framework and RMSC policy and procedure manual are used respectively by ten per cent of the respondents.

In addition, a large bank has two main clients (SARB and ALCO) with respect to banking book IRR reporting. This bank reports regulatory return BA330 to SARB (external client) and ALCO (internal client) on a monthly basis.

Figure 6.12 Framework(s) and/or Standard(s) that Banking Book IRR Management Reporting is Aligned to



Note: All figures are rounded. The base year is 2009. The response of an individual bank may be included in more than one category.

One medium bank indicated that it has an integral management approach across all consolidated attributes of the ERM framework, with ongoing assessment reviews of internal and external economic influences as well as making use of international guidance.

Lastly, a small bank has a risk management framework that deals with all relevant risks. Regulatory returns also form a basis for risk reporting and measurement of banking book IRR, which are reported to the internal audit committee, the board of directors and the SARB.

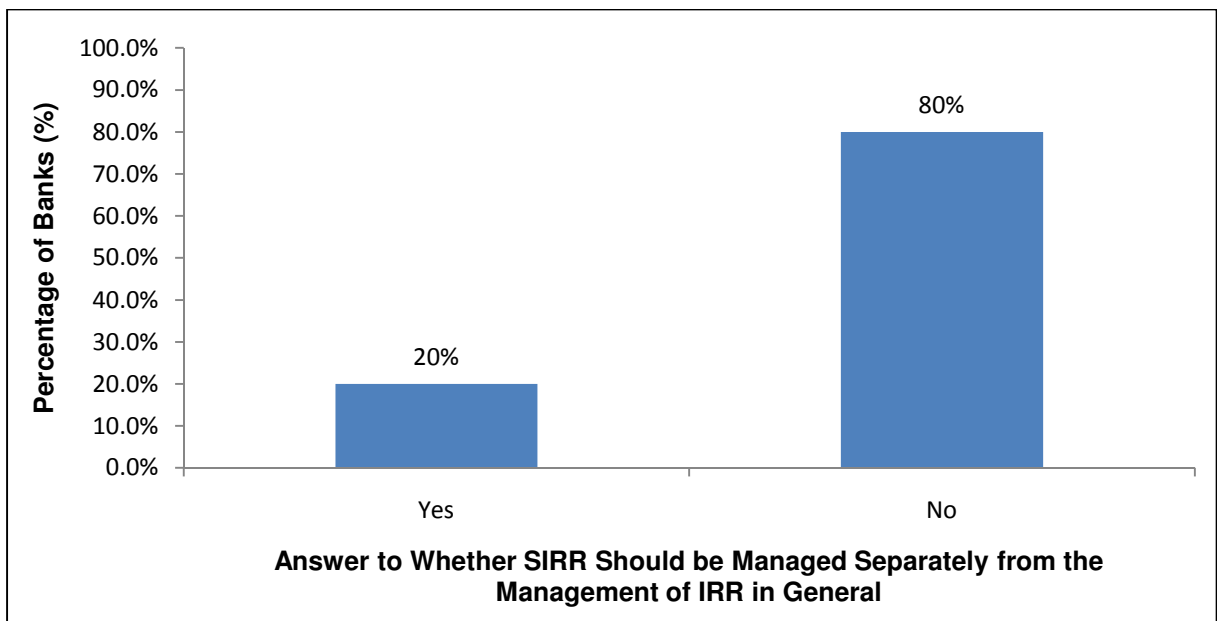
5. OVERALL BANK INTEREST RATE RISK MANAGEMENT FRAMEWORK

Issues dealt with in this section are the periodical repo-rate adjustments causing SIRR. Repo-rate movements result in the potential financial losses of commercial banks, as banking products are directly and/or indirectly linked to the repo-rate.

5.1 SIRR Management

In a close-ended question, respondents were asked to indicate whether SIRR should be managed separately from the management of IRR in general. Figure 6.13 reveals that only twenty per cent of banks believe that SIRR should be managed separately from the management of IRR in general. Only ten per cent of banks have developed a framework or system to manage SIRR separately, while the other ten per cent of banks are exposed to repricing risk and basis risk, the major components of banking book IRR, which are managed as part of the same process or forum as general IRR management although a separate strategy is used.

Figure 6.13 SIRR Managed Separately from General IRR



Note: All figures are rounded. The base year is 2009.

Those banks that do not manage SIRR separately from general IRR have various explanations for such practice. One respondent believes that offsetting opportunities for SIRR with other exposures within general IRR management exist. One bank adopted a hedging strategy to SIRR through mitigating long-term (greater than one year) IRR with three-month JIBAR or LIBOR whilst the treasurer has discretion over SIRR positioning.

One respondent indicated that the bank adopted a holistic approach to risk management within the governance framework, while according to another respondent, all long-term IRR

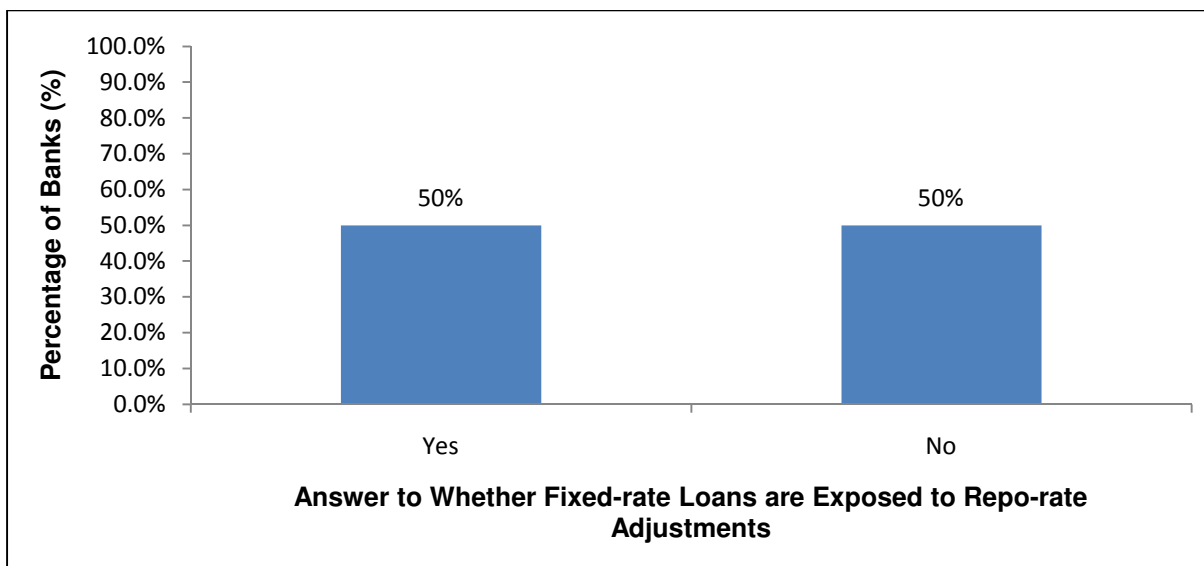
eventually becomes short term, therefore no separation of short-term and long-term IRR management is necessary.

Other explanations relate to the banks' risk management strategies. For instance, strategies should be integrated; SIRR is an integral part of strategic level IRR but cognizance should be given to peaks caused by unusual occurrences. In a small bank environment, banks take a macro view and short-term risk management will be aligned with general risk management.

5.2 MPC Repo-rate Adjustments Causing SIRR

As stated in the research problems of the study and the questionnaire, uncertainty of repo-rate adjustments between two consecutive MPC meetings leads to potential losses in the portfolio of fixed-rate loans and floating-rate deposits. Since floating-rate deposits change with repo-rate movements, losses merely relate to option risks embedded in products. Direct interest income loss arises from fixed-rate loans, subject to both downside repo-rate movement and optionality risk. The latter risk refers to the risk created due to options embedded in the portfolio being exercised, causing a loss of interest income. Options have an asymmetric payoff which makes measurement difficult.

Respondents were asked in a close-ended question to indicate whether fixed-rate loans issued just after the previous MPC meeting are likely to cause additional exposure to IRR where the repo-rate is adjusted. As banks generally have a distinguished portfolio composition with various hedges in place, only fifty per cent of banks believe that fixed-rate loans are exposed to potential losses as shown in Figure 6.14.

Figure 6.14 Fixed-rate Loans Exposed to Repo-rate just after MPC Rate Adjustments

Note: All figures are rounded. The base year is 2009.

The remaining fifty per cent of banks that believe fixed-rate loans are not exposed to repo-rate adjustments at all give different explanations as follows.

One respondent believes that there are fixed-rate derivative instruments immediately available to hedge against such exposure. One respondent believes that fixed-rate loans can be appropriately managed and there is no SIRR to the bank. But the main risk is the basis risk between prime overdraft-linked loans and JIBAR-linked deposits. One respondent does not believe the timing issue of repo-rate adjustments material, as the bank has inflation data available on a regular basis, although from various sources², so the bank has a continuously updated view on short-term interest rate movements. One small bank deals with repo- and prime overdraft-linked products, while another one follows the economic forecast and rate-pricing of large banks. Therefore, they are not exposed to repo-rate changes.

With regards to key elements required to manage short-term (two months) IRR exposure, eight of ten respondents have different opinions (See Table 6.3).

² For instance, banks' own inflation, Reuter's monthly inflation, and information provided by other market intelligence suppliers. However, the study assumes that SARB quarterly inflation is the official data.

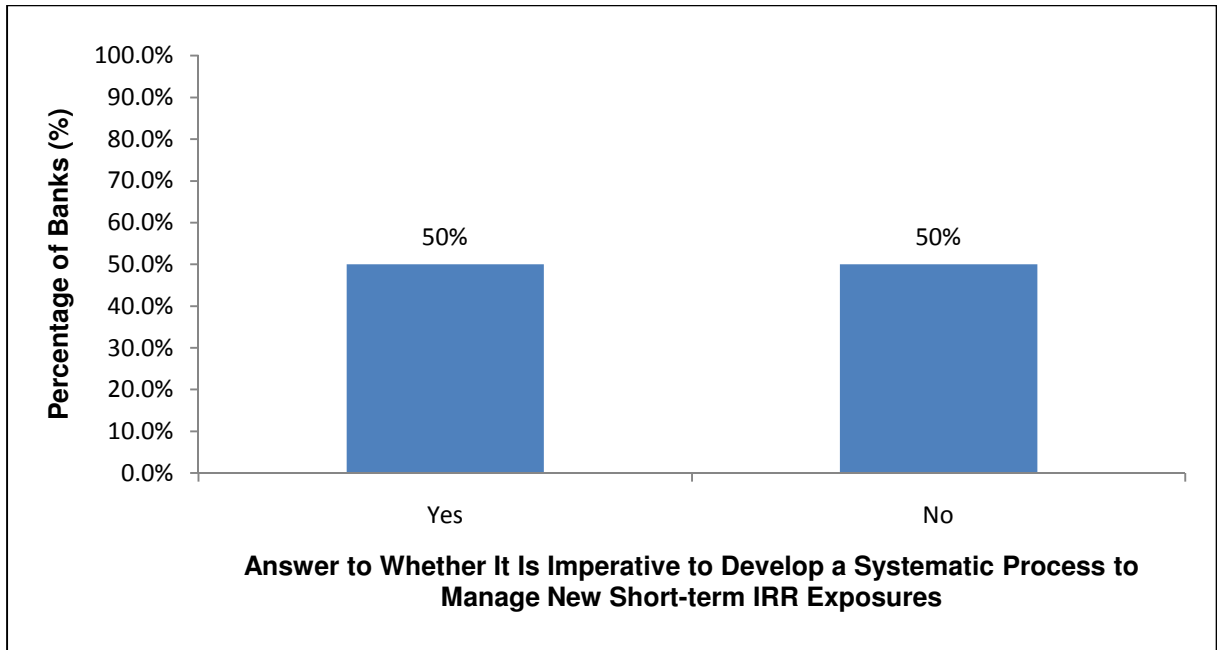
Table 6.3 Key Elements Required to Manage Short-term Interest Rate Exposure

Respondent Banks (bank names are not mentioned for confidentiality reasons)	Key Elements Required to Manage Short-term Interest Rate Exposure
Bank One	Matched FTP, where fixed-rate assets are match-funded in the business unit, while IRR is transferred to treasury where it is managed on a portfolio basis
Bank Two	Difficult to hedge exposure less than four months
Bank Three	Risk identification, monitoring and pricing. A thorough understanding on how such risk arises, supported by appropriate risk-based reporting and the ability to price for such risk
Bank Four	Forecast on interest rate cycle and hedging through swaps and FRA's
Bank Five	Portfolio offsetting strategy through duration immunization
Bank Six	Portfolio offsetting strategy through borrowing-long and lending-short
Bank Seven	Matching funding profile, where assets and liabilities mostly match each other's interest rates and contractual maturity
Bank Eight	Matching duration of interest rate swaps

5.3 Development of Systematic Processes for SIRR

Respondents were asked in a close-ended question to indicate whether it is imperative to also develop a systematic process to manage new SIRR exposures. Even though all banks have a general risk management process that is aligned to the strategic objective of the bank as a whole, Figure 6.15 shows that fifty per cent of banks believe that it is imperative to develop a process specifically to manage SIRR.

Figure 6.15 Imperative to Develop SIRR Management Process



Note: All figures are rounded. The base year is 2009.

The remaining banks believe that there is no need for such a process, due to the less complex product lines and lower risk environment they are exposed to. They explained why such a practice is adopted as follows.

One respondent indicated that the management of SIRR is, to a large extent, dependent upon the markets in which the bank operates, and the depth and liquidity of those markets.

Such repo-rare induced SIRR is not a new risk for one bank, as the respondent believes that banks have always been exposed to monetary policy decisions and the timing issues involved.

Two respondents do not believe such exposure is relevant to their banks, as one bank only lends fixed-rate products resulting in a unique rate-profile, while the Basel II Accord is not applicable to the other bank as it is a small bank.

Concerning the key elements needed for an adjustment to current SIRR management practices, four of the ten respondents briefly described their current practices (See Table 6.4).

Table 6.4 Key Elements Needed for an Adjustment to Current SIRR Management Practices

Respondent Banks (bank names are not mentioned for confidentiality reasons)	Key Elements Needed for An Adjustment to Current SIRR Management Practices
Bank One	Repricing GAP and balance sheet simulation
Bank Two	Aligning the repricing of assets and liabilities within the markets in which the bank operates
Bank Three	Using a combination of stress-testing, internal inflation targeting and scenario-testing
Bank Four	Applying guidelines for fixed-rate lending with required hedging strategies, taking into account funding nuances in different countries

One large bank made an additional comment that FTP is an essential mechanism to ring-fence and transfer risk internally to a department where it can be managed. Therefore, a business unit issuing a fixed-rate loan does not have to manage banking book IRR, if such a fixed-rate loan was match-funded by the bank's treasury.

6. BANK RISK MANAGEMENT POLICY STATEMENT AND STRATEGY

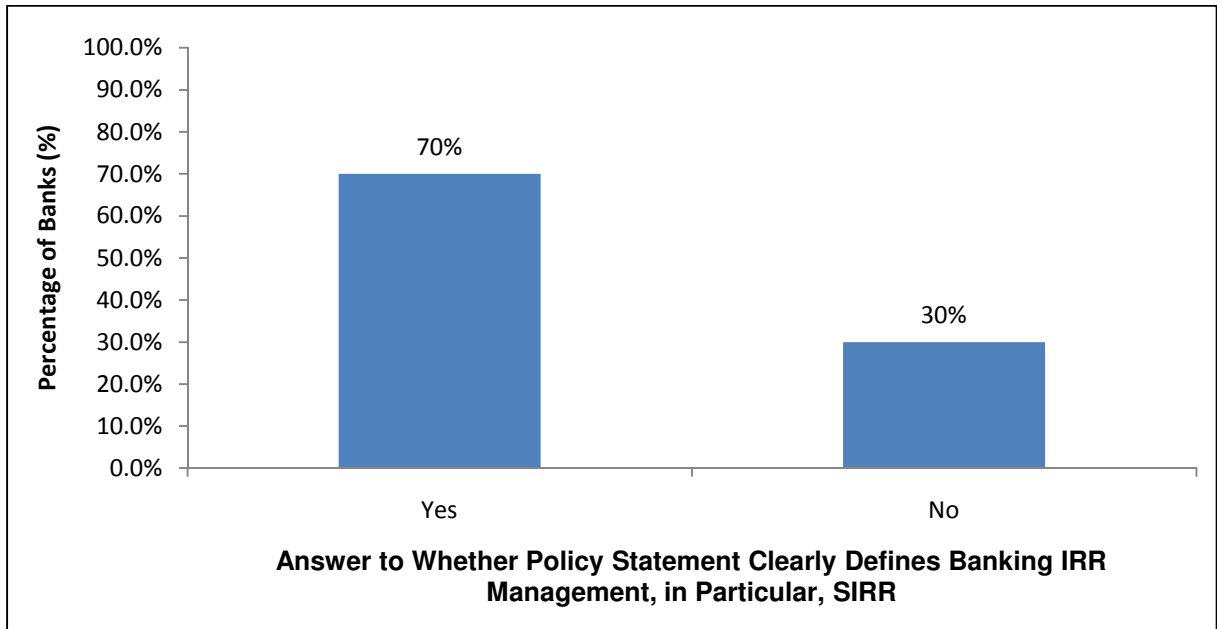
In this section, banking book IRR is addressed in the risk management policy statement and/or strategy, where banks incorporate all aspects of risk management such as the risk management process, principles, standards, risk management framework and governance into their framework. Risk management strategy is customized according to a specific risk scenario rather than a general one-size-fit-all approach, and subject to regular adjustments, depending on banks' views on future interest rate cycles.

6.1 Risk Management Policy Statement

Respondents were asked in a close-ended question to indicate whether the bank has developed a policy statement that clearly defines banking book IRR management, in particular the SIRR. As shown in Figure 6.16, seventy per cent of banks have developed a policy statement that

clearly defines banking book IRR management and SIRR, whereas thirty per cent have not yet developed such a policy.

Figure 6.16 Risk Management Policy Statement



Note: All figures are rounded. The base year is 2009.

Among the remaining banks that have not yet developed such a policy statement, some banks manage SIRR through a combination of strategy and policy, while other banks do not define SIRR but rather define IRR in general in the policy statement. Some banks define IRR in the risk management framework rather than in the policy statement.

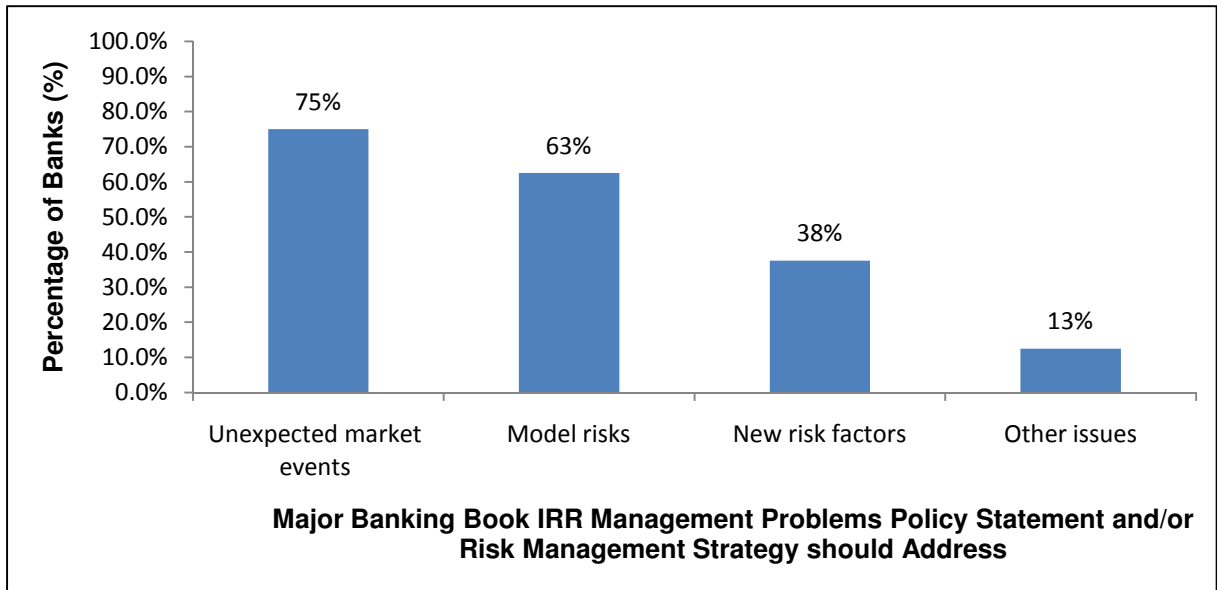
6.2 Risk Issues Addressed in the Policy Statement

Respondents were asked in a multiple-choice question to indicate the major banking book IRR management problems that the policy statement and/or risk management strategy should address. As illustrated in Figure 6.17, seventy five per cent of banks that believe the formulation and use of a policy statement is a relevant practice in their banks, include unexpected market events, sixty three per cent of banks address model risks, and thirty eight per cent of banks address new risk factors in their policy statements.

One respondent's policy statement mainly covers risk limits, risk management guidelines and the description of measurement techniques. The ALCO mandate usually provides insights on the management of banking book IRR, to which liquidity risk is closely related. Therefore,

banks should consider incorporating both IRR and liquidity risks and their trade-offs in the banking book risk management policy statement. ALCO will be the unit to manage such trade-offs and also ratifies risk mitigation decisions and changes in policy documents and methodologies.

Figure 6.17 Issues Addressed in Policy Statement



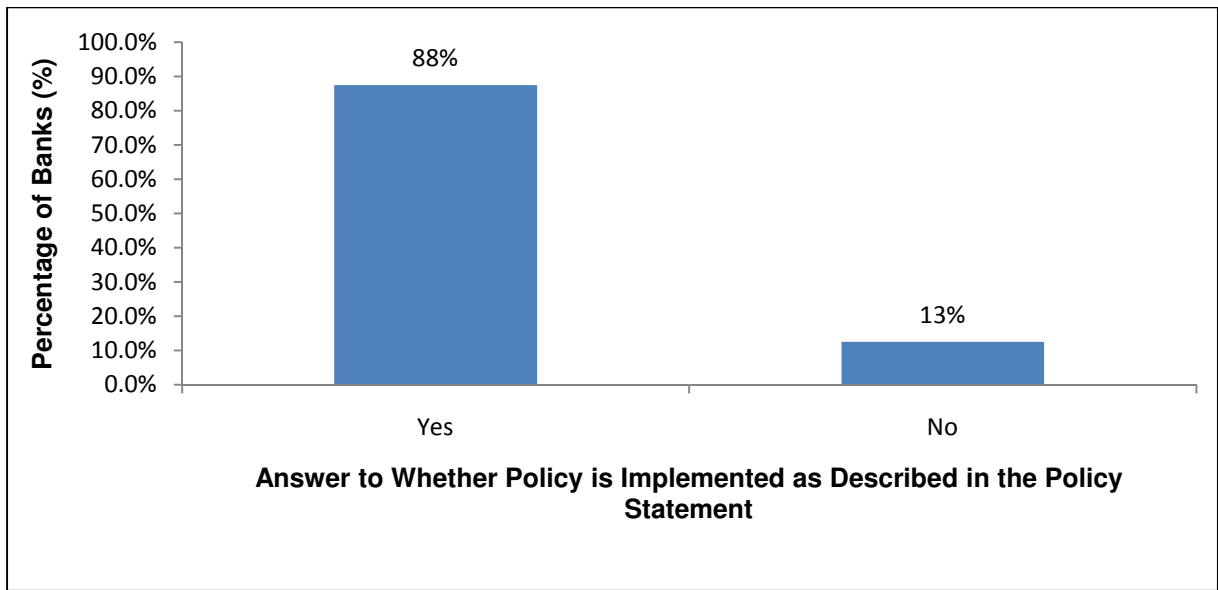
Note: All figures are rounded. The base year is 2009. Other issues include limits, guidelines, intentional mismatching, prudential management and the description of measurement techniques. Note that the response of an individual bank may be included in more than one category.

One respondent strongly suggests a policy statement to cover the basis risk between prime overdraft-linked assets and call-linked or three-month JIBAR-linked deposits. One respondent also includes scenario analysis, while one respondent incorporates issues of intentional mismatching and prudential management.

6.3 Policy Implementation

Respondents were asked in a close-ended question to indicate whether the policy is implemented as described in the policy statement. As illustrated in Figure 6.18, eighty eight per cent of banks have implemented their policies or strategies as stipulated in the policy statement or strategic document.

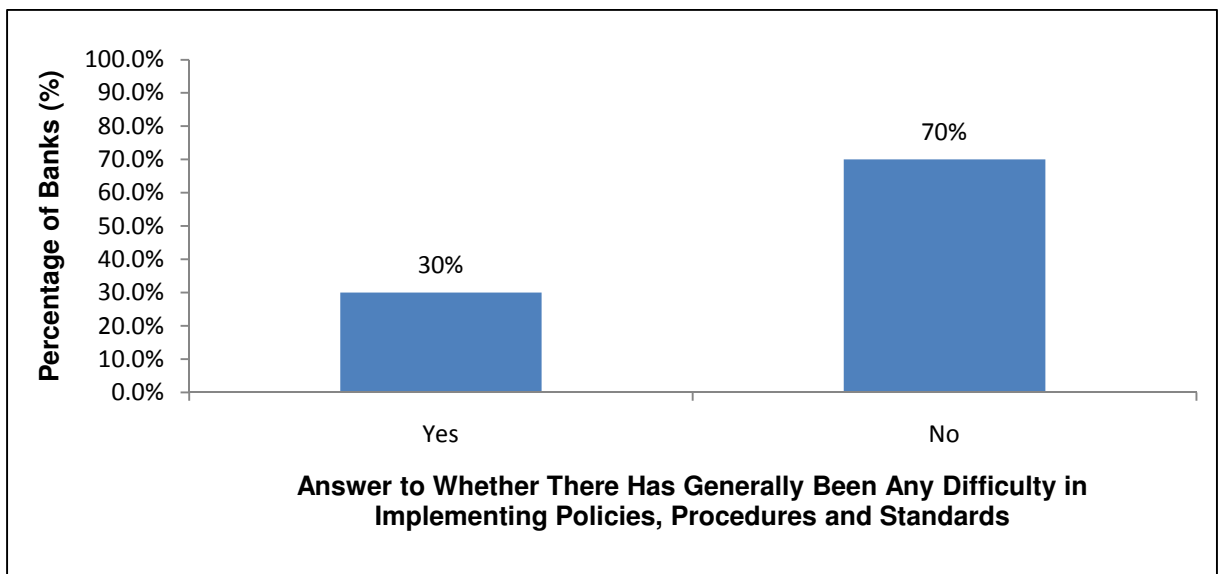
Figure 6.18 Policy Implementation as in Policy Statement



Note: All figures are rounded. The base year is 2009.

In a close-ended question, respondents were asked to indicate whether there has generally been any difficulty in implementing the policies, procedures and standards in the bank. If the answer is yes, brief explanations are required. Figure 6.19 illustrates that seventy per cent of banks have no problem implementing their policy statements.

Figure 6.19 Difficulty of Policy Implementation



Note: All figures are rounded. The base year is 2009.

The remaining banks that have problems in policy implementation give different reasons.

Some banks explain that implementation difficulty is occasionally caused by external market forces. For instance, banks' hedging strategies cannot be implemented as planned due to the lack of capacity to hedge caused by a "herd effect", in other words, widely held similar views in the market. However, this is not a major issue, as prudential management can limit risks caused by external market forces to within certain tolerance bands. Some banks explain that unclear policy documents lead to the lack of understanding on policy statements.

7. RISK IDENTIFICATION AND PRIORITIZATION

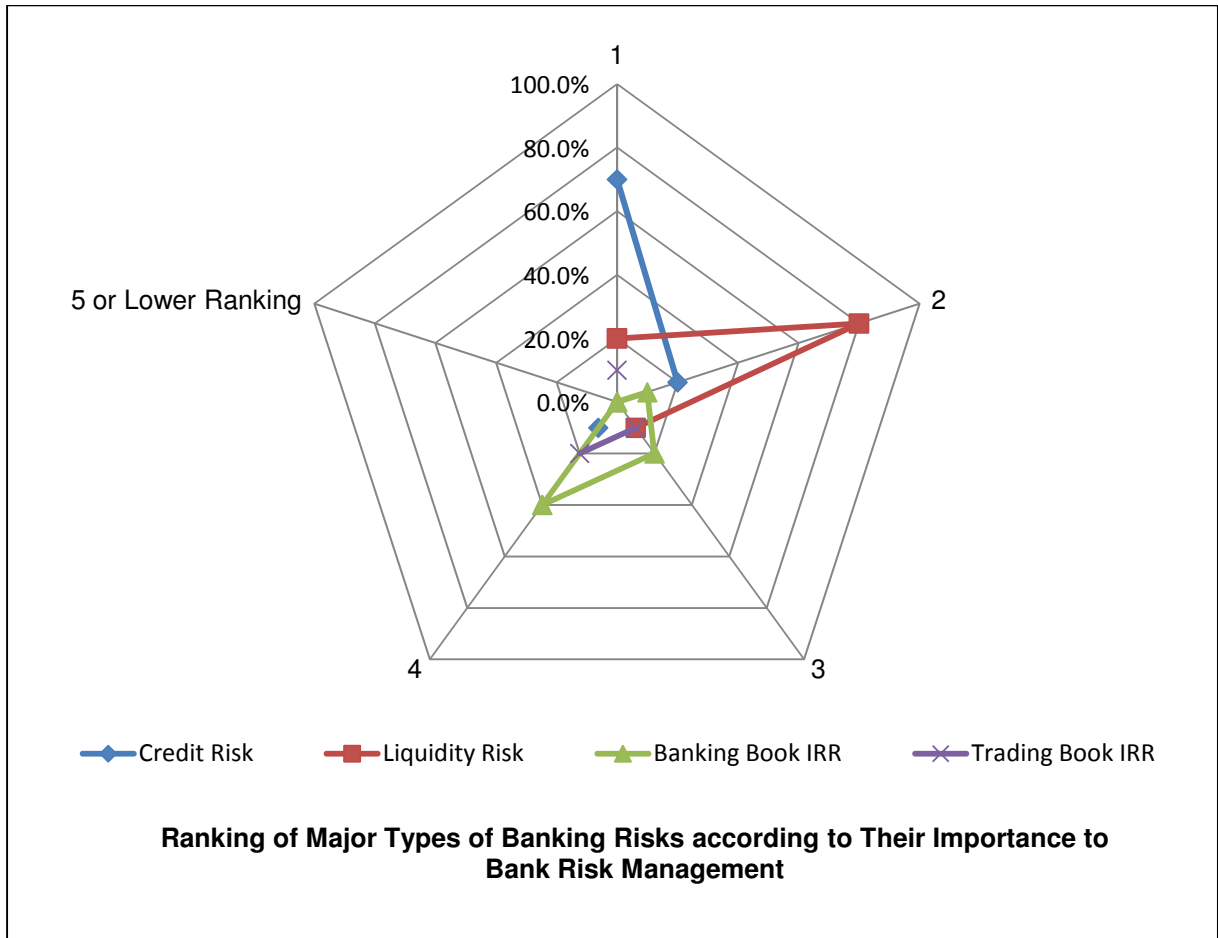
Effective risk identification and prioritization enable banks to manage risks and achieve target profitability. The first important step of the risk management process is to clearly identify key sources of risk, based on which banks develop their hedging policies or strategies. Banks have traditionally identified their major categories of risks, according to their portfolio composition. Risks are prioritised through capital allocation to each risk category.

New risk types will also be incorporated as banking portfolios expand. The sources of each risk vary and are interrelated. For instance, inflation itself is a risk and in turn a source of IRR. Therefore, effective identification and prioritisation of risk sources and categories, as well as interconnections among risks are crucial for capital allocation and the achievement of risk-return targets.

7.1 Major Types of Banking Risks

Respondents were asked to rank a predefined set of risk types that banks were exposed to, according to their importance within the bank. In Figure 6.20, seventy per cent and eighty per cent of banks rank credit risk and liquidity risk respectively as their top two types of risks. The ranking of banking and trading book IRR have a mixed result, but they are the third or fourth largest risks to which banks are exposed. Other types of risks including operational, cultural, model and embedded-option or derivative risks are ranked fifth or lower.

Figure 6.20 Major Categories of Banking Risks



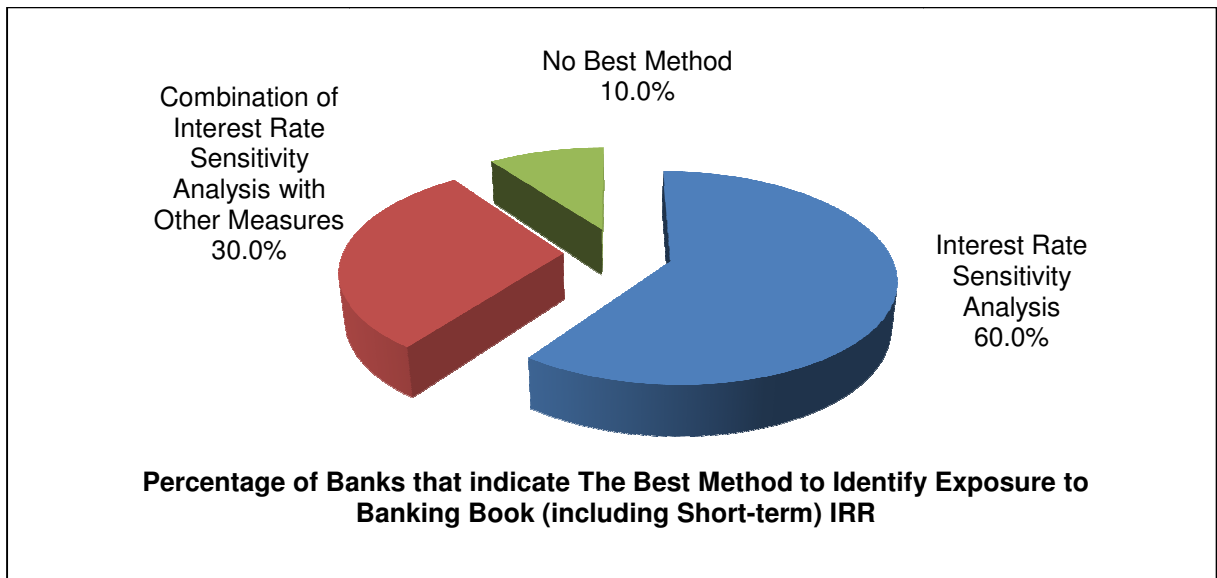
Note: All figures are rounded. The base year is 2009. 1 means most important while 5 means least important. Note that the response of an individual bank may be included in more than one category.

However, one large bank believes that all types of risks and the management thereof are equally important, as some are quantifiable while others are qualitative risk in nature. In addition, certain risks are systemic and therefore the result of others. For example, IRR can be a result of liquidity risk. Hence, it is not an easy task to measure and compare risks of different nature in terms of their importance to risk management.

7.2 Measures of Risk Identification

In a multiple-choice question, respondents were asked to indicate what the best method is to identify exposure to banking book (including short-term) IRR. As shown in Figure 6.21, sixty per cent of banks have selected sensitivity analysis for banking book IRR identification.

Figure 6.21 Risk Identification Tools



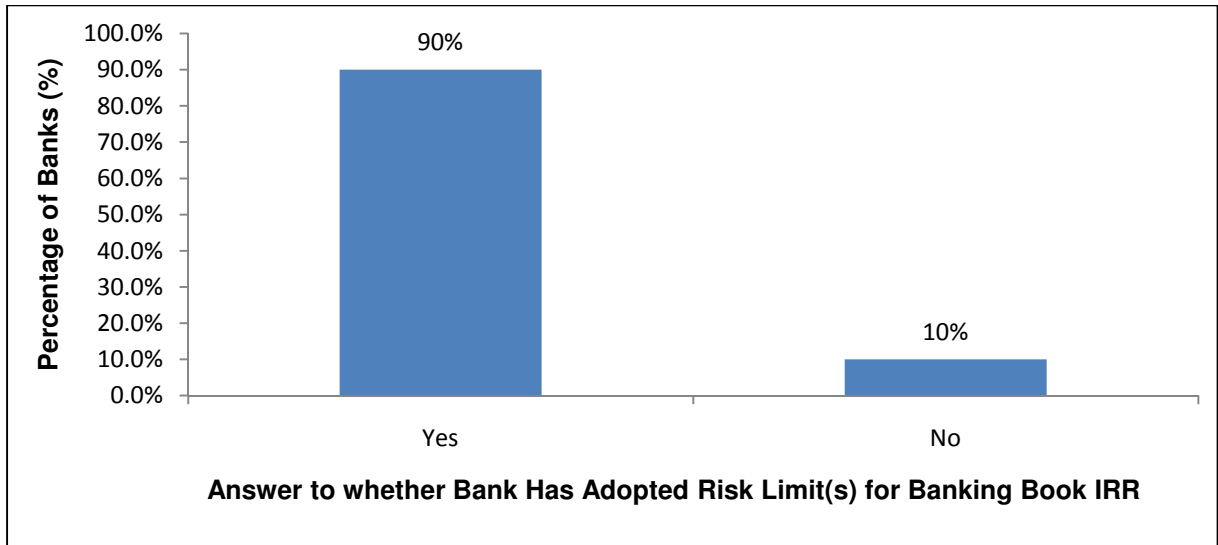
Note: All figures are rounded. The base year is 2009. Other measures include EaR sensitivity, credit impairment sensitivity, economic value of equity, and principal component analysis.

Other measures include EaR sensitivity, credit impairment sensitivity, economic value of equity, and principal component analysis. One respondent indicated that it is important to have a toolbox of methods including earnings risk (static and dynamic) and NPV risk evaluated, under different scenarios.

7.3 Risk Limit

Respondents were asked in a close-ended question to indicate whether the management of the bank has adopted risk exposure limit(s) for the banking book IRR management. As illustrated in Figure 6.22, ninety per cent of banks have adopted limits for banking book IRR management. Banks that do not set risk limits do, however, closely monitor the banking book IRR. However, the risk-limit setting is a rather subjective decision, which takes profitability targets, strategic objectives, risk tolerance levels and other factors into account.

Figure 6.22 Risk Limit



Note: All figures are rounded. The base year is 2009.

Those respondents that have adopted risk limits were asked in an open-ended question to indicate how the risk limit is set. Seven of nine respondents have adopted different procedures for setting their risk limit(s), as shown in Table 6.5.

Table 6.5 Procedure for Setting Risk Limit(s)

Respondent Banks (bank names are not mentioned for confidentiality reasons)	Procedure for Setting Risk Limit(s)
Bank One	Based on the Basel II capital accord, economic capital (or risk limits) in support of banking book IRR should not exceed a percentage of the sum of Tier I and Tier II capital
Bank Two	Risk limits are related to EaR sensitivity, interest rate sensitivity, and economic value of equity
Bank Three	Risk limits are based on risk tolerance levels and perceived scenario likelihoods
Bank Four	Risk limits are based on the potential effect of IRR on headline earnings per share
Bank Five	Risk limits are based on the repricing GAP analysis
Bank Six	Risk tolerance and prudential limit are approved by the board of directors
Bank Seven	Board approves risk limits by continually monitoring both sides of the balance sheet in a changing interest rate scenario

SIRR Management Process of Commercial Banking

The risk limit in one bank is set according to the Basel II capital accord. Basel II requires that the economic capital in support of banking book IRR should not exceed a percentage of the sum of Tier I and Tier II capital. The specific percentage is discretionary, as banks may choose a capital reserve level that is higher than the required eight per cent of the total risk-weighted assets. Banking book IRR as part of the total risk capital is allocated a certain percentage, which varies from one bank to another.

One large bank deploys three methods to define risk limits, corresponding to the three methods of risk identification.

- EaR sensitivity analysis is done through a one per cent parallel reduction in interest rates. The resulting change in NII as a percentage of bank's total equity is compared with an approved risk limit.
- Interest rate sensitivity analysis is supported by credit impairment sensitivity and is benchmarked regularly against peer group as a risk limit.
- Economic value of equity is measured for a one per cent parallel decrease in interest rates. The resulting change in equity value is then compared with a predetermined risk limit.

All three methods set risk limits by taking into account historical and expected future exposure in the respective method through which risks are quantitatively measured.

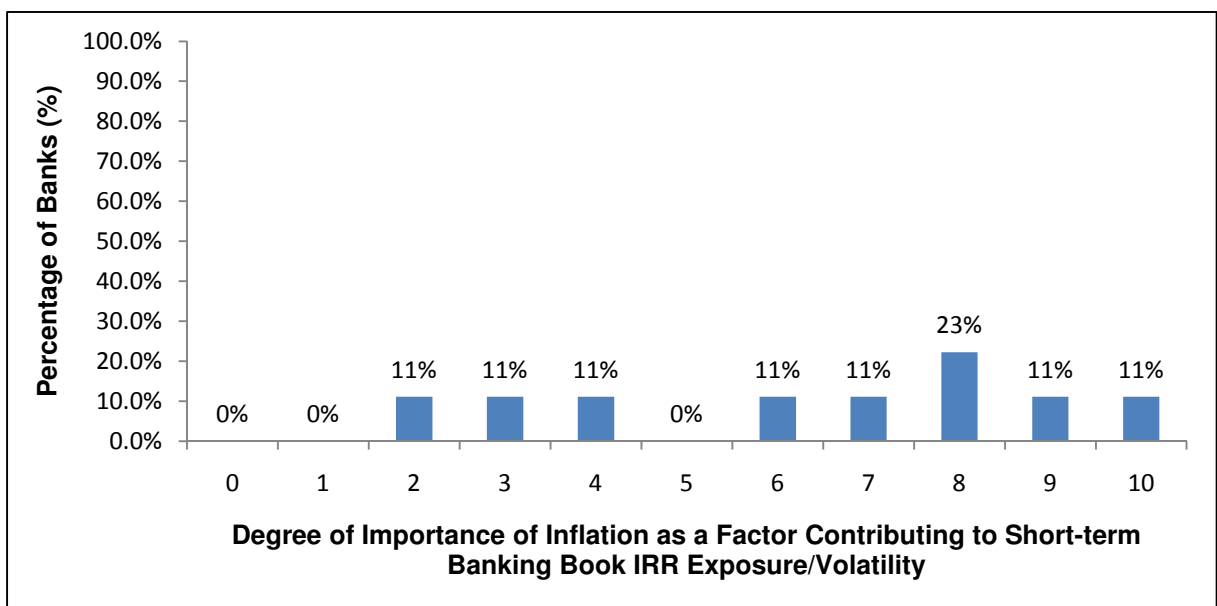
Other means to set risk limits are based on risk tolerance levels and perceived scenario likelihoods, the potential effect of IRR on headline earnings per share, and the repricing GAP analysis through which risk limits are set.

Two small banks adopted a board approval approach for risk limits. One of them uses this approach by presenting prudential limit management results to the board. Prior to the board meeting, such results are reviewed against risk tolerance during the strategic planning process. The other bank that is asset sensitive and purely interest rate driven continually monitors both sides of the balance sheet in a changing interest rate scenario.

7.4 Inflation-induced IRR

Respondents were asked in a scale question to indicate how important inflation is as a factor contributing to short-term banking book IRR exposure or volatility. As shown in Figure 6.23, on a scale of attitude from zero to ten, sixty seven per cent of banks to agree more than fifty per cent of the time that inflation is an important factor contributing to banking book IRR volatility. The remaining respondents did not give specific reason for their disagreement on this issue.

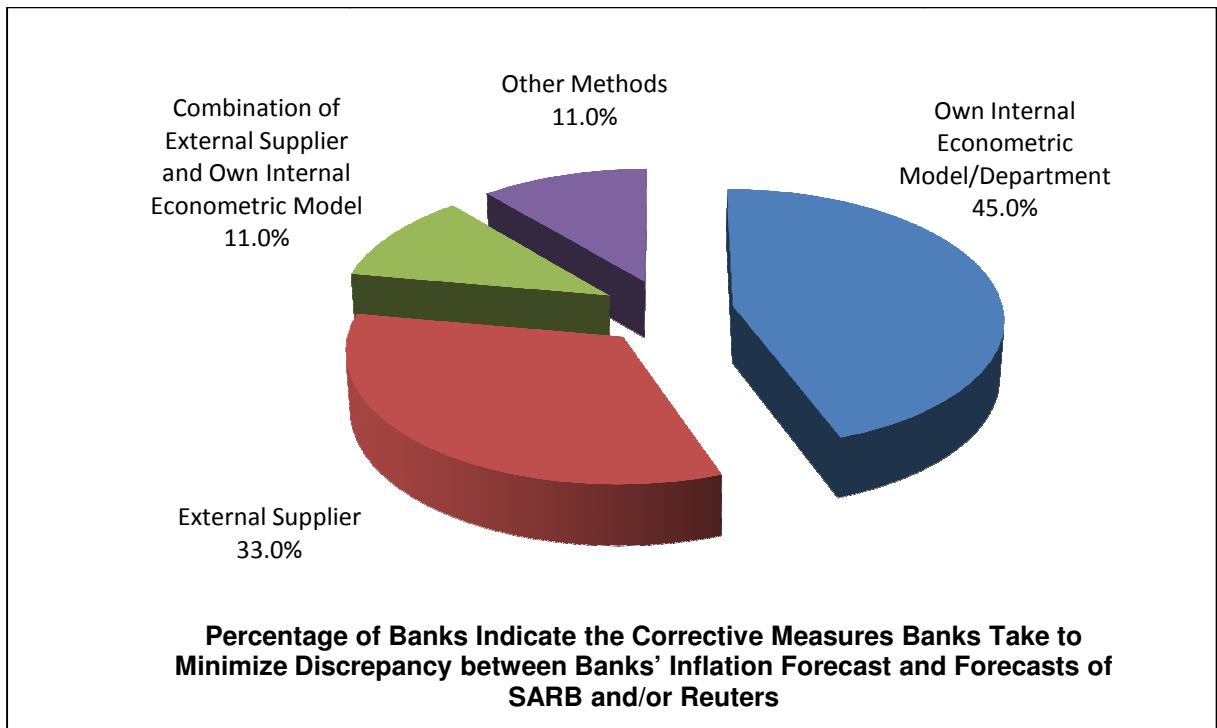
Figure 6.23 Inflation as Factor Causing Banking SIRR Exposure/Volatility



Note: All figures are rounded. The base year is 2009. 0 means not important while 10 means very important.

In a multiple-choice question, respondents were asked to indicate how the bank determines or forecasts the inflation for the planning period. As shown in Figure 6.24, forty four per cent of banks choose their own internal econometric model or department to forecast inflation. External suppliers of inflation figures are used by thirty three per cent of banks, while eleven per cent choose a combination of external supplier and own internal econometric model. Other ways of getting hold of inflation figures include internal controls and external economists' forecasts.

Figure 6.24 Methods Used to Obtain Inflation Figures/Forecast

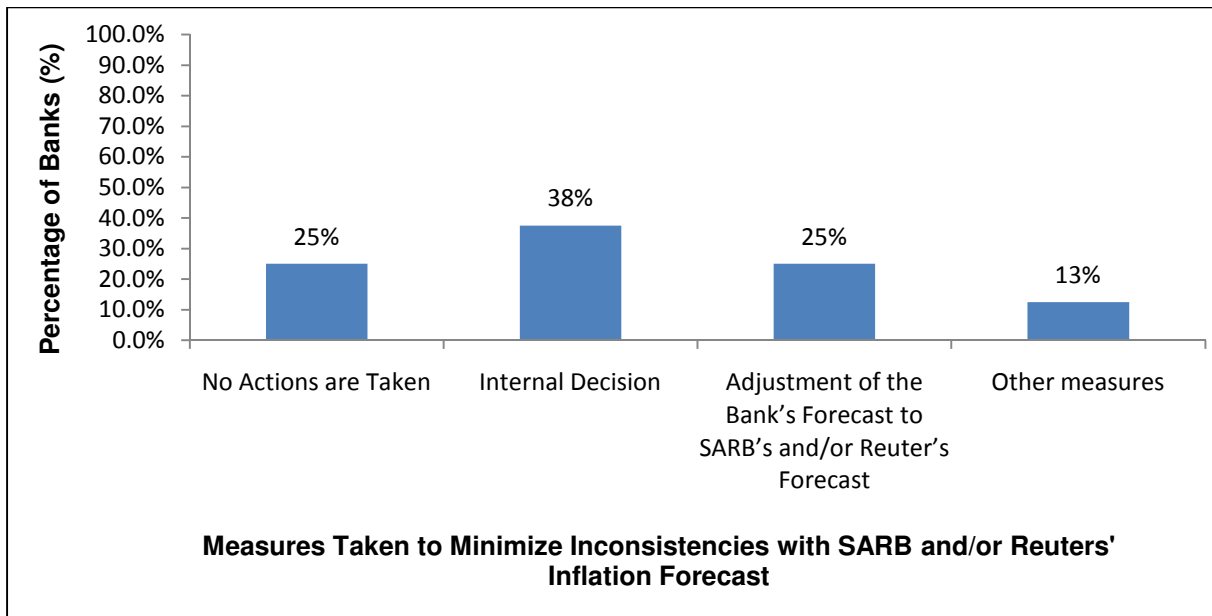


Note: All figures are rounded. The base year is 2009. Other methods include internal controls and external economist.

In most cases, banks' inflation forecast will deviate from the forecasts of the SARB and/or Reuters. Respondents were asked in a multiple-choice question to indicate which corrective measures the bank takes to minimize such inconsistencies.

Figure 6.25 illustrates that twenty five per cent of banks take no actions for such inconsistencies, while thirty eight per cent make adjustments based on their internal decisions. As can be seen, twenty five per cent adjust their inflation forecast to the SARB's and/or Reuter's inflation forecast. Other measures include trading inflation-linked instruments, cross-referencing all forecasts with primary reliance placed on banks' internal economic unit, ALCO decision-making, and gap adjustment and the determination of the underlying drivers of the differential.

Figure 6.25 Measures to Adjust Bank’s Inflation Forecast

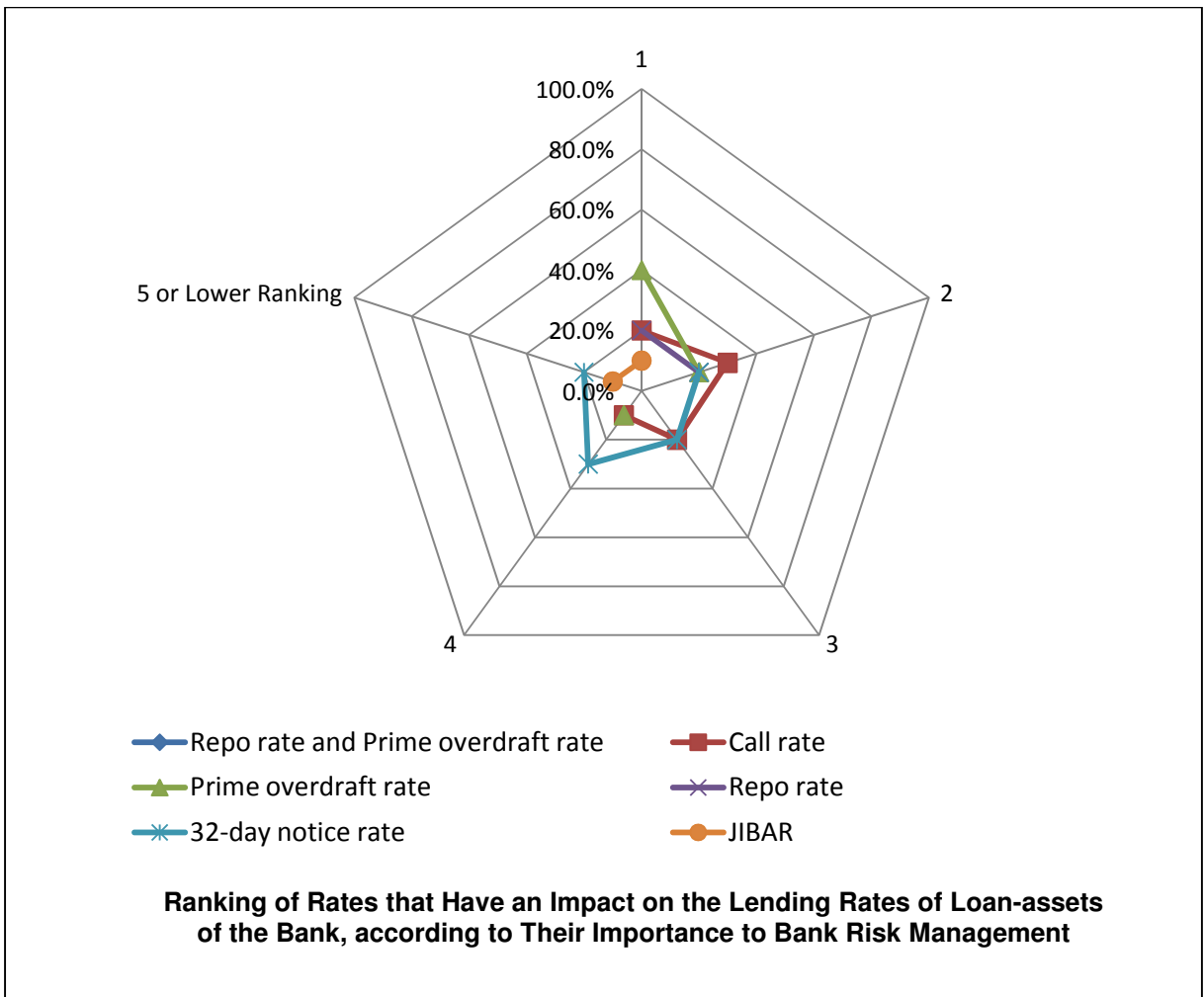


Note: All figures are rounded. The base year is 2009. Other measures include the trading of inflation-linked instrument, cross-referencing all forecasts, and gap adjustment. Note that the response of an individual bank may be included in more than one category.

7.5 Rates that Influence Lending and Borrowing Rates

According to their importance to bank risk management, respondents were asked to rank a predetermined set of risks that impact on lending rates. Figure 6.26 shows that forty per cent of banks rank the prime overdraft rate first, thirty per cent rank the call rate second, and fifty per cent rank 32-day notice rate the third or fourth. Other rates have a mixed result, including JIBAR, repo-rate, and repo-rate and prime overdraft rate as some respondents see these two rates as equally important.

Figure 6.26 Rates that Impact Lending Rates

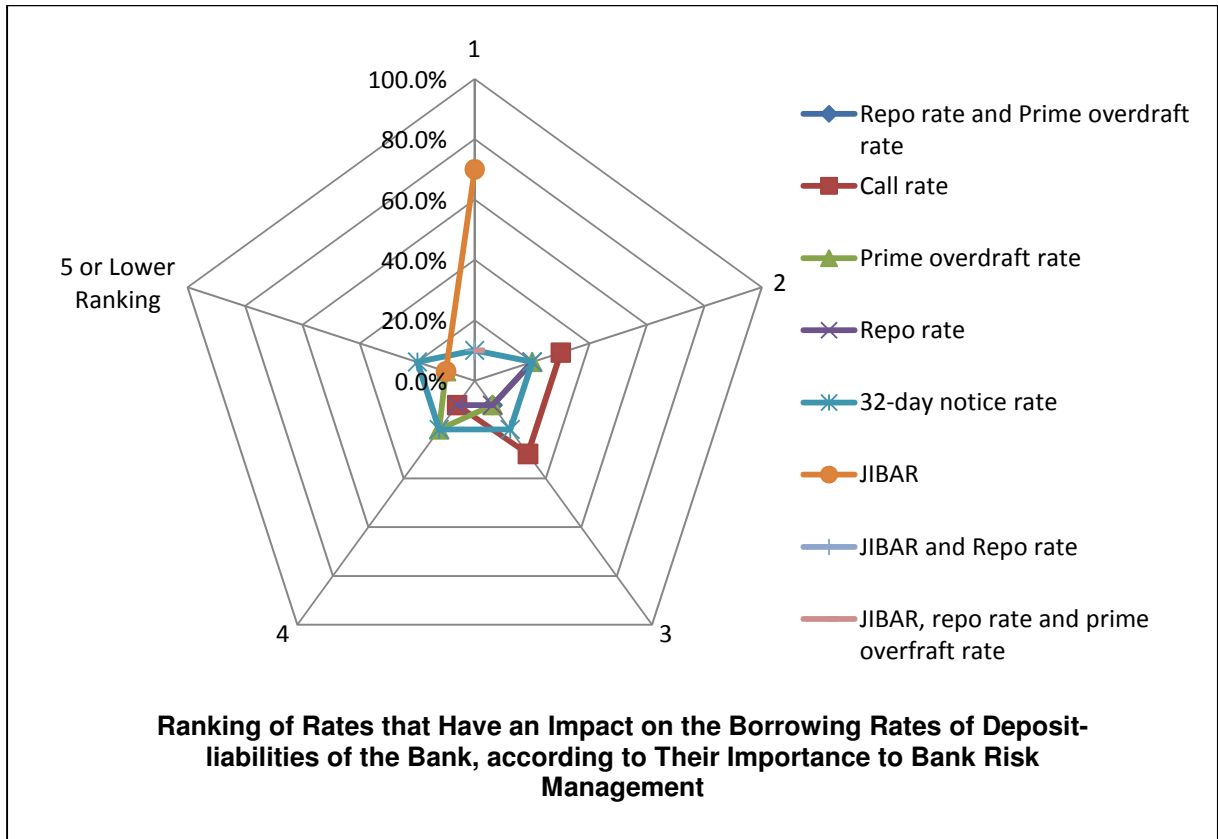


Note: All figures are rounded. The base year is 2009. 1 means most important while 5 means less important.

Note that the response of an individual bank may be included in more than one category.

Similarly, respondents were asked to rank a predefined set of risks that have an impact on borrowing rates. Figure 6.27 illustrates that seventy per cent of banks rank the JIBAR rate first, thirty per cent rank the call rate second, and forty per cent rank the 32-day notice rate third or fourth. Mixed answers were received for other rates where the repo-rate, a combination of the repo-rate and prime overdraft rate, overnight rate and the NCD rate were important.

Figure 6.27 Rates that Impact Borrowing Rates

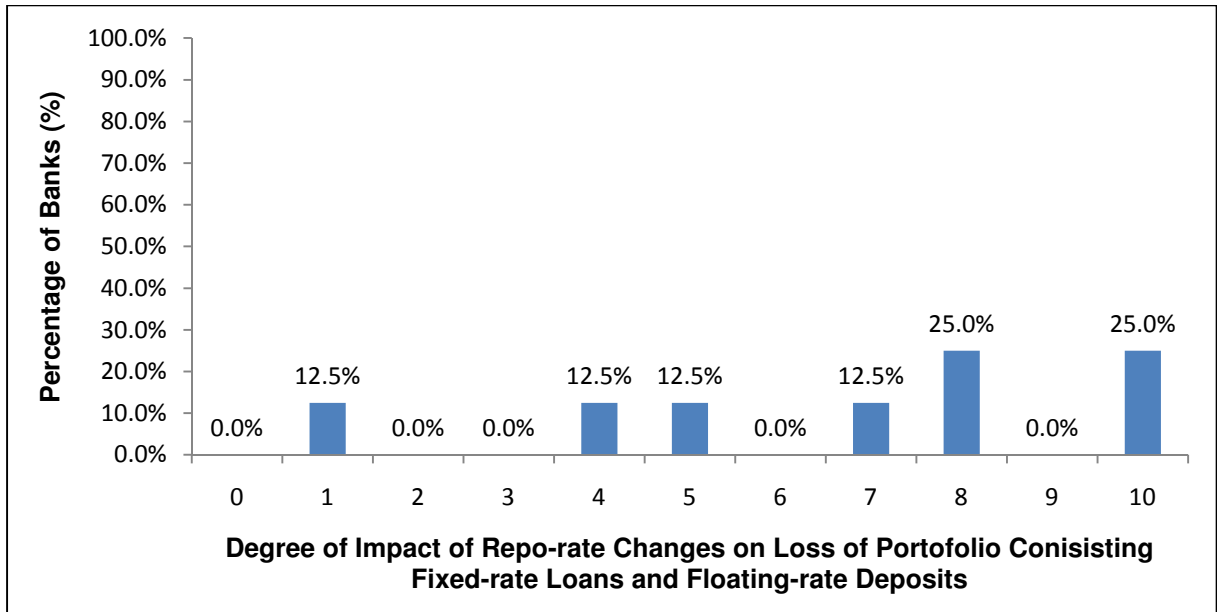


Note: All figures are rounded. The base year is 2009. 1 means most important while 5 means less important. Note that the response of an individual bank may be included in more than one category.

7.6 Repo-rate Changes Causing IRR

Respondents were asked to indicate on a scale how they see the impact resulting from repo-rate adjustments on the portfolio consisting of long-term fixed-rate loans and short-term floating-rate deposits. In Figure 6.28, sixty three per cent of banks give a score of seven or above on a scale of attitude from zero to ten, indicating that they agree more than fifty per cent of the time that repo-rate adjustment will be a potential risk exposure (i.e. decline of net interest margin) to the portfolio consisting of long-term fixed-rate loans or advances and short-term floating-rate deposits.

Respondents, who do not agree with such a statement, believe that such an exposure can be hedged with derivatives. Those respondents who did not express an opinion as regards this issue do not believe it is applicable to their banks, because their primary exposure is short-term fixed-rate deposits funding variable-rate assets.

Figure 6.28 Repo-rate Exposure

Note: All figures are rounded. The base year is 2009. 0 means no impact while 10 means high impact.

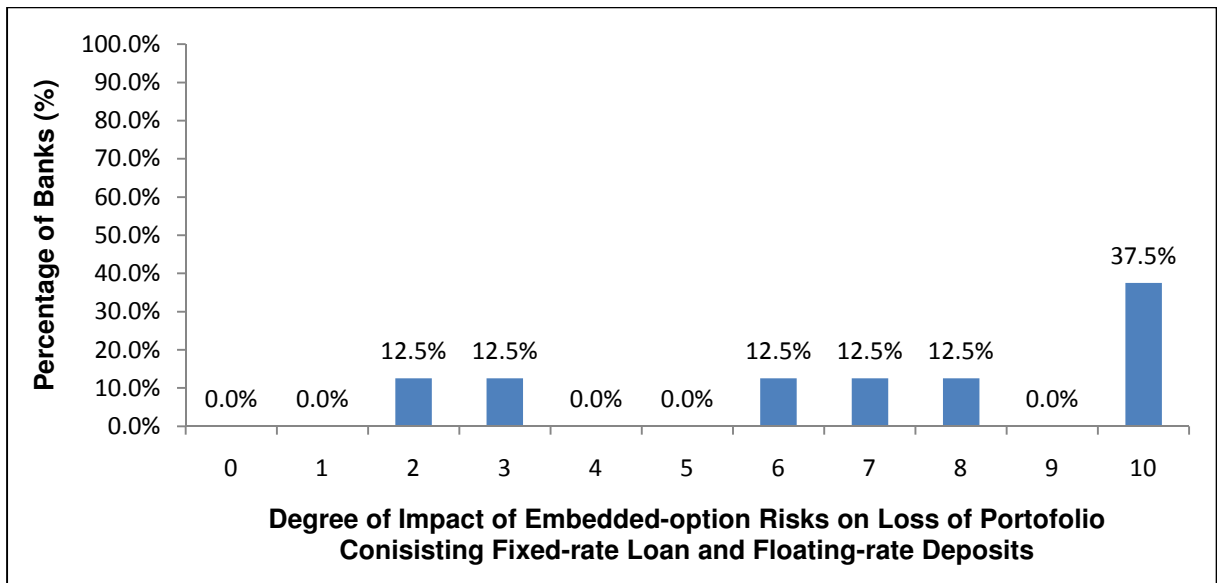
7.7 Embedded-option Risks

On a scale from zero to ten, respondents were asked in a question on the degree of impact of the embedded option-risks of assets and liabilities on the portfolio consisting of long-term fixed-rate loans and short-term floating-rate deposits, in an expected declining interest rate environment. Figure 6.29 indicates that seventy five per cent of banks give a score of six or above to agree more than fifty per cent of the time that embedded-option risks of assets and liabilities could cause a significant risk exposure (i.e. decline of interest income) to the portfolio consisting of long-term fixed-rate loans or advances and short-term floating-rate deposits.

One respondent who strongly agrees with such a risk statement explains that the bank is “asset sensitive”, which means that the falling interest rate environment naturally shrinks the bank’s margins. Variable rate assets such as mortgages will immediately reprice downwards when the repo-rate or prime overdraft rate declines. For its wholesale funds like three-, six-, and nine-month NCDs, the bank will have to wait until the next rollover date in order to benefit from the lower rate, which exposes the bank to option risks.

One respondent commented that it is fairly immaterial for the bank, as embedded options only apply to variable-rate loans and deposits.

Figure 6.29 Impact of Embedded-option Risks on Portfolio Loss



Note: All figures are rounded. The base year is 2009. 0 means no impact while 10 means high impact.

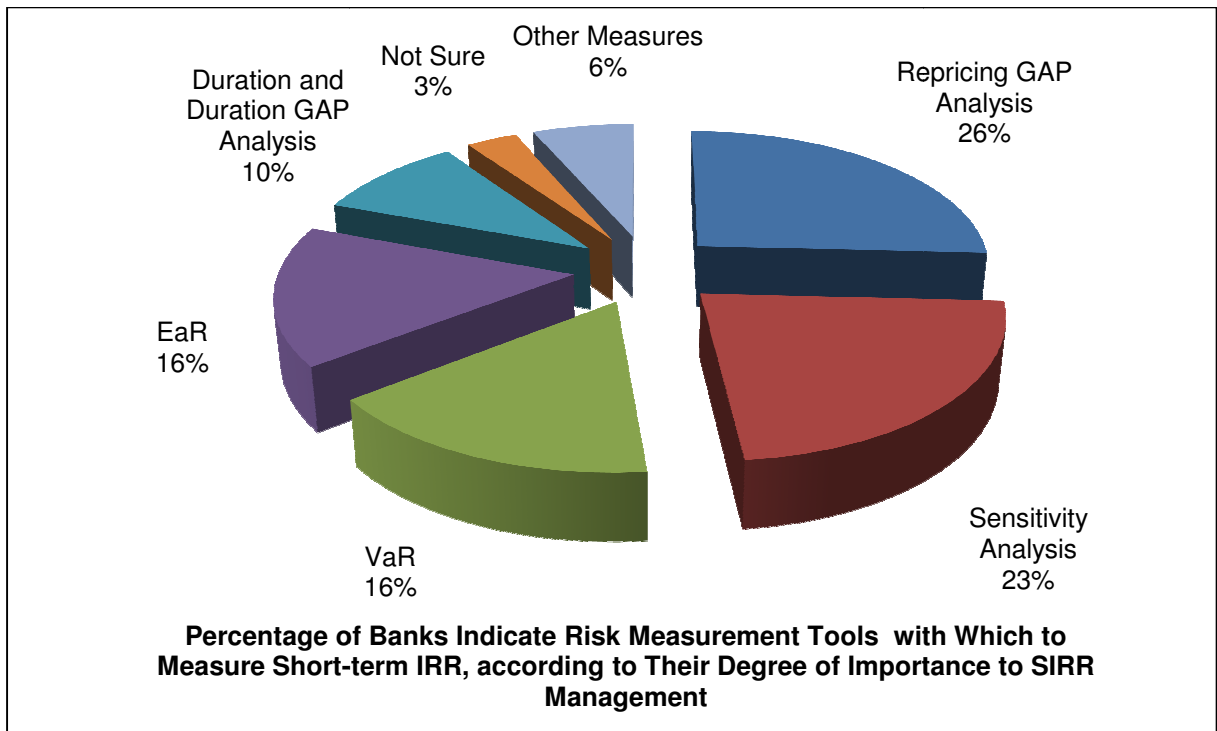
8. RISK MEASUREMENT

Banks measure risks that are quantifiable such as banking book IRR. Through stress-testing, banks are able to control risks within risk limit. However, less quantifiable risks such as embedded-option risks add uncertainty to the accuracy of risk measurement, resulting in variance between actual and expected outcomes.

8.1 Risk Measurement Tools

Respondents were asked in a multiple-choice question to indicate which risk measurement tools are the most important when measuring SIRR. Figure 6.30 indicates that twenty six per cent of banks have deployed repricing GAP analysis to measure short-term banking book IRR. Twenty three per cent use sensitivity analysis, while sixteen per cent use VaR and EaR respectively as tools to measure SIRR. Other tools for risk measurement include economic VaR (eVaR) and determining fair value.

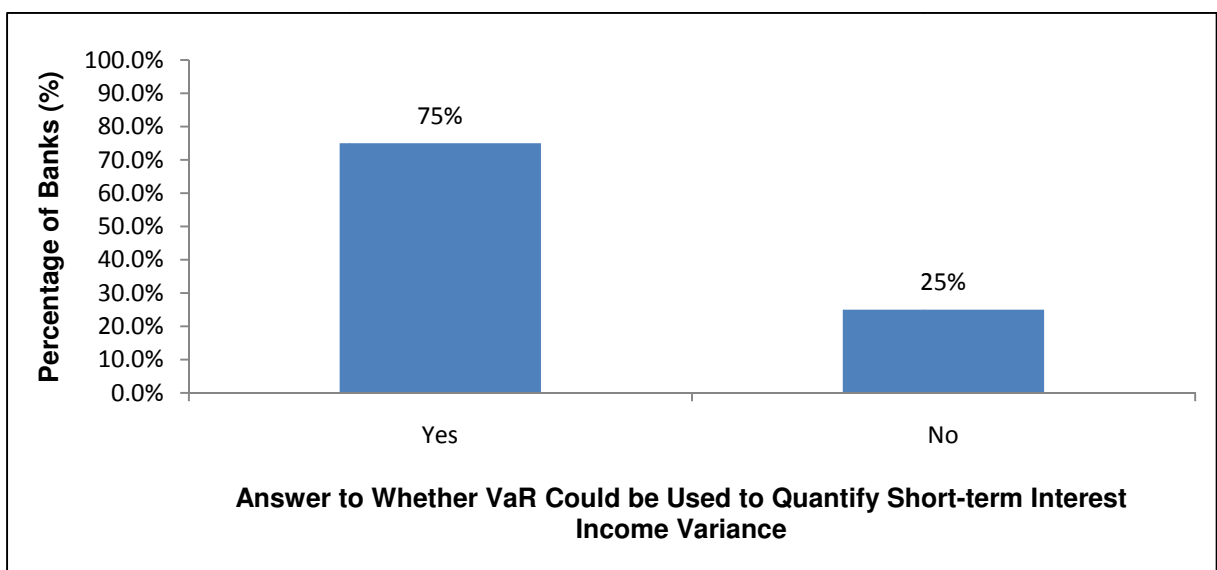
Figure 6.30 Risk Measurement Tools



Note: All figures are rounded. The base year is 2009. Other measures include eVaR and fair value.

In a close-ended question, respondents were asked to indicate whether VaR could be used to quantify short-term interest income variance. Figure 6.31 shows that seventy five per cent of banks believe that VaR can be used to quantify short-term interest income variance. The remaining twenty five per cent are in favour of dynamic EaR.

Figure 6.31 Quantification of Interest Income Variance with VaR

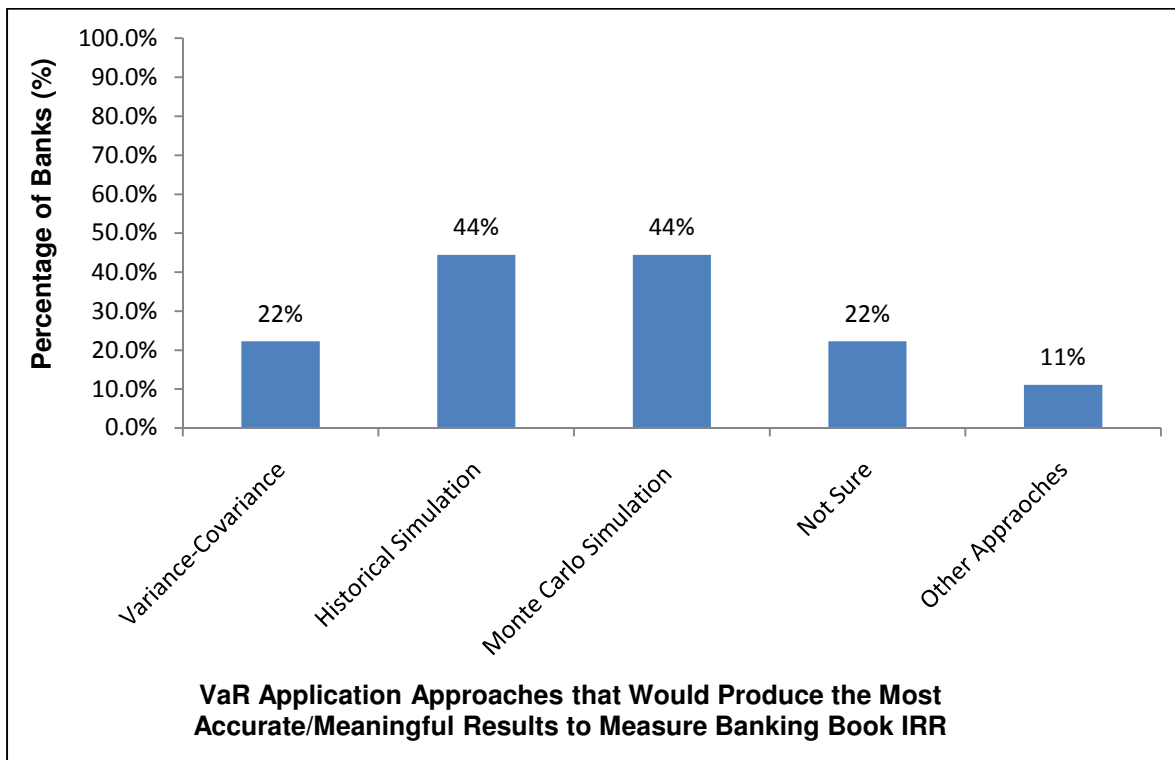


Note: All figures are rounded. The base year is 2009.

8.2 Banking Book VaR

Respondents were asked in a multiple-choice question to indicate which VaR application approaches would, if the banking book VaR technique is used or its use for the future is planned, produce the most accurate or meaningful results. Most banks (forty four per cent) choose Monte Carlo simulation and historical simulation methods respectively. Another approach also includes dynamic balance sheet simulation as illustrated in Figure 6.32.

Figure 6.32 Most Accurate and/or Meaningful VaR Methods to Measure Banking IRR

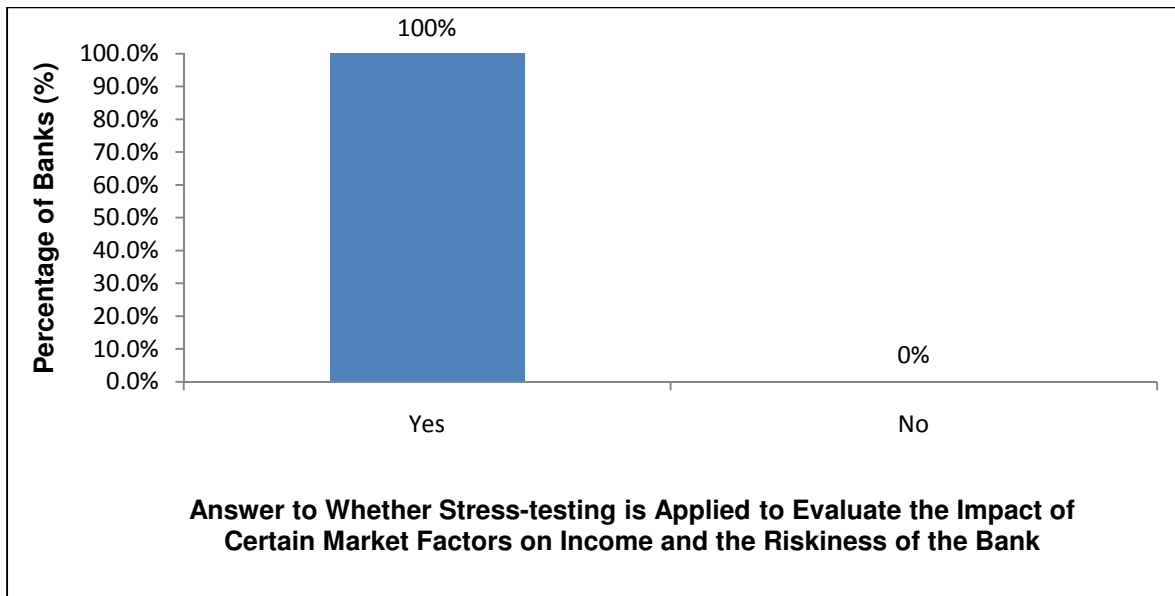


Note: All figures are rounded. The base year is 2009. Other approaches include dynamic balance sheet simulation.

8.3 Stress-testing

In a close-ended question, respondents were asked to indicate whether the bank applies stress-testing to evaluate the impact of certain market factors on income and the riskiness of the bank. It was found that all banks have applied stress-testing to evaluate the impact of certain market factors on income and the riskiness of the bank (See Figure 6.33).

Figure 6.33 Application of Stress-testing to Evaluate the Impact of Market Factors



Note: All figures are rounded. The base year is 2009.

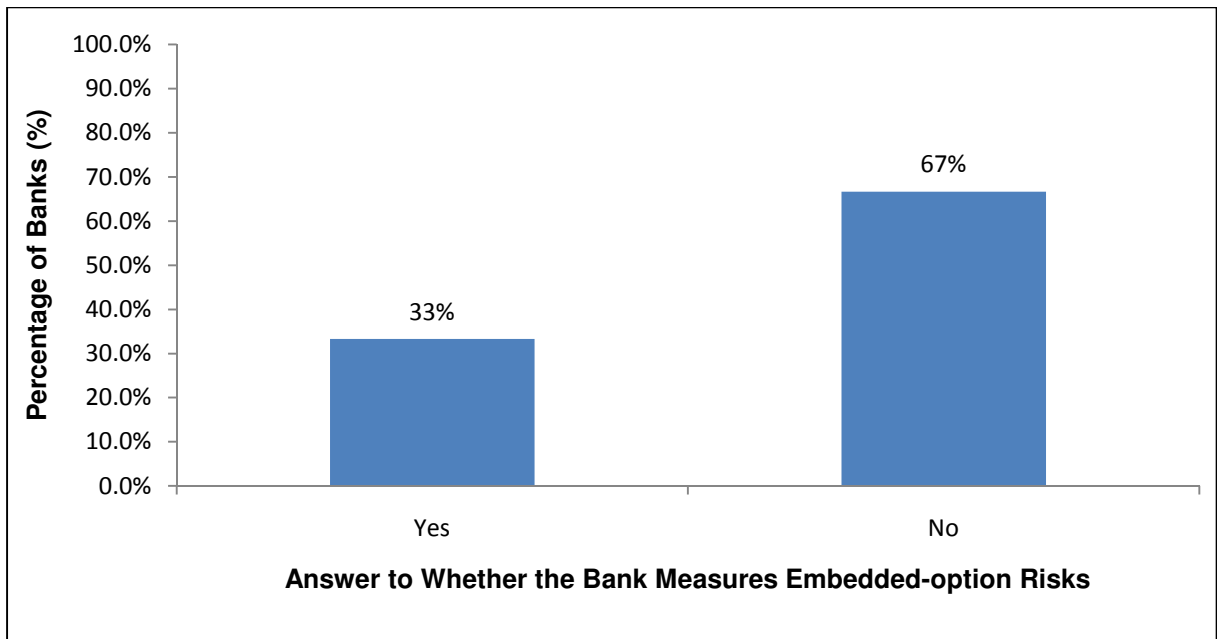
Respondents were asked in an open-ended question to specify the key elements for the stress-testing procedure. Nine out of ten banks responded to this question. Although each bank may have a different explanation of the key elements included in their stress-testing, considering values under different scenarios is one aspect that most banks include in this procedure, as illustrated in Table 6.6.

Table 6.6 Key Elements Important for the Stress-testing Procedure

Respondent Banks (bank names are not mentioned for confidentiality reasons)	Elements Important for the Stress-testing Procedure
Bank One	Plausible stress-scenarios that are either historical or constructed events
Bank Two	Shocks along the yield curve, leads and lags of offsetting risks such as credit risk
Bank Three	Factors to determine economic shocks are the size of interest rate shock, duration of interest rate shock, and the speed of interest rate changes. House price index, GDP growth, unemployment rate, JSE index and exchange rates are additional factors
Bank Four	Prime overdraft rate vs. JIBAR basis risk, which is simulated through yield curve shifts and twists
Bank Five	Expected future interest rates, historical analysis, and the effect of rate changes on the income statement
Bank Six	Setting of scenarios
Bank Seven	Rates and rate shock basis point assumptions based on recent history and the present view on interest rate cycle
Bank Eight	All items are under prudential limit management
Bank Nine	Continual and forward-looking methods to adjust profit forecasts as a result of varying interest rate scenarios

8.4 Measurement of Embedded-option Risks

In a close-ended question, respondents were asked to indicate whether banks measure embedded-option risks. Figure 6.34 shows that only thirty three per cent of banks measure embedded-option risks.

Figure 6.34 Measurement of Embedded-option Risks

Note: All figures are rounded. The base year is 2009.

Among those banks that do not measure option risks, reasons include limited exposure to embedded-option risk, advances generally linked to prime overdraft rate and in turn no primary IRR incurred on pre-payments, as well as fixed-rate deposits with a breakage fee covering the embedded early withdrawal risk.

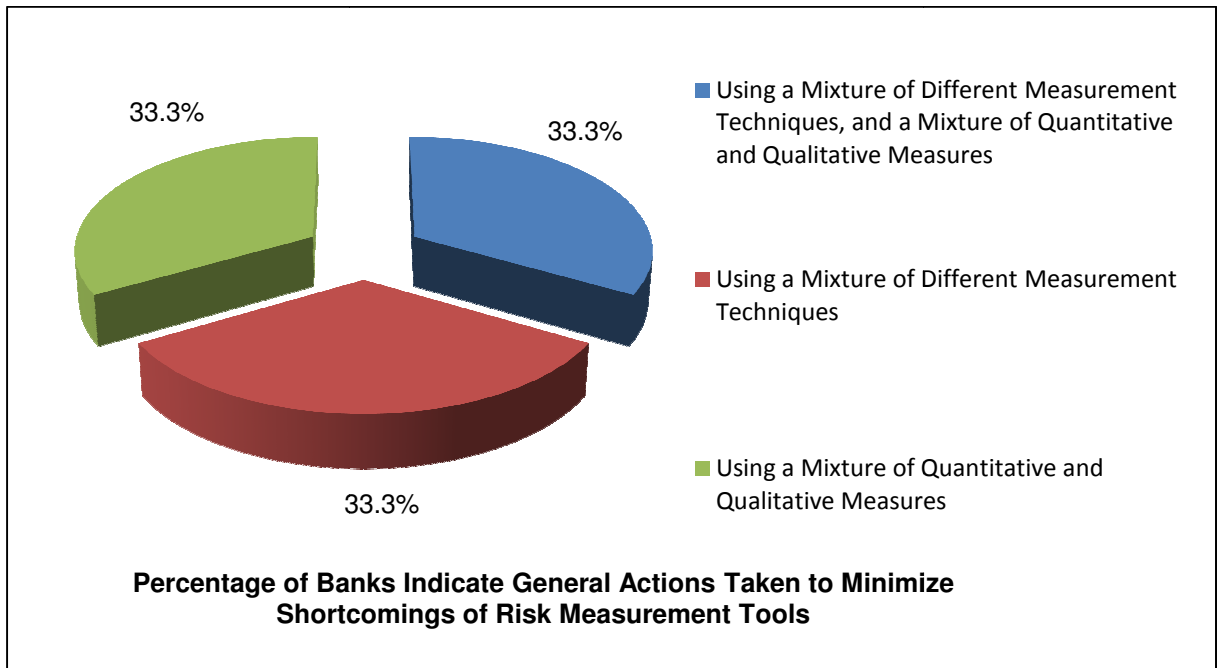
Respondents were asked in a multiple-choice question to indicate which methods are used to measure embedded-option risks. There are only three respondents that shared their opinions. One bank uses balance sheet simulation employing behavioural models as prepayments and defaults are sources of optionality in the banking book. Another bank uses a combination of regression analysis and external risk scanning methods, while the third respondent bank relies solely on regression analysis to measure embedded-option risks.

8.5 Minimization of Shortcomings of Risk Measurement Tools

Respondents were asked in a multiple-choice question to indicate which actions (generally) are taken to minimize the shortcomings of risk measurement tools such as GAP analysis and VaR. Figure 6.35 indicates that thirty three per cent of banks use a mixture of different measurement techniques and a mixture of qualitative and quantitative measures to minimize the shortcomings of risk measurement tools such as GAP and VaR. Thirty three per cent use

a mixture of different measurement techniques only. The remaining thirty three per cent use a combination of quantitative and qualitative measures to minimize the shortcomings of risk measurement tools.

Figure 6.35 Techniques to Minimize the Shortcomings of Risk Measurement Tools



Note: All figures are rounded. The base year is 2009.

In an open-ended question, respondents were asked to specify the key elements that are important to minimize the shortcomings of IRR measurement tools. Current practices include the experience of relevant committee members, and the holistic risk management view on the cause and effect of inaccuracy of risk measurement. One small bank stated that it requires an active RMSC to quantify changes of interest rates that would influence the NIM. However, another bank relies on the external validation of methodologies. Other elements include a clear understanding of the shortcomings of various measuring tools and the solution of such shortcomings are overcome through a mixture of different measurement techniques, and a mixture of quantitative and qualitative measures.

9. MANAGING FINANCIAL RISKS

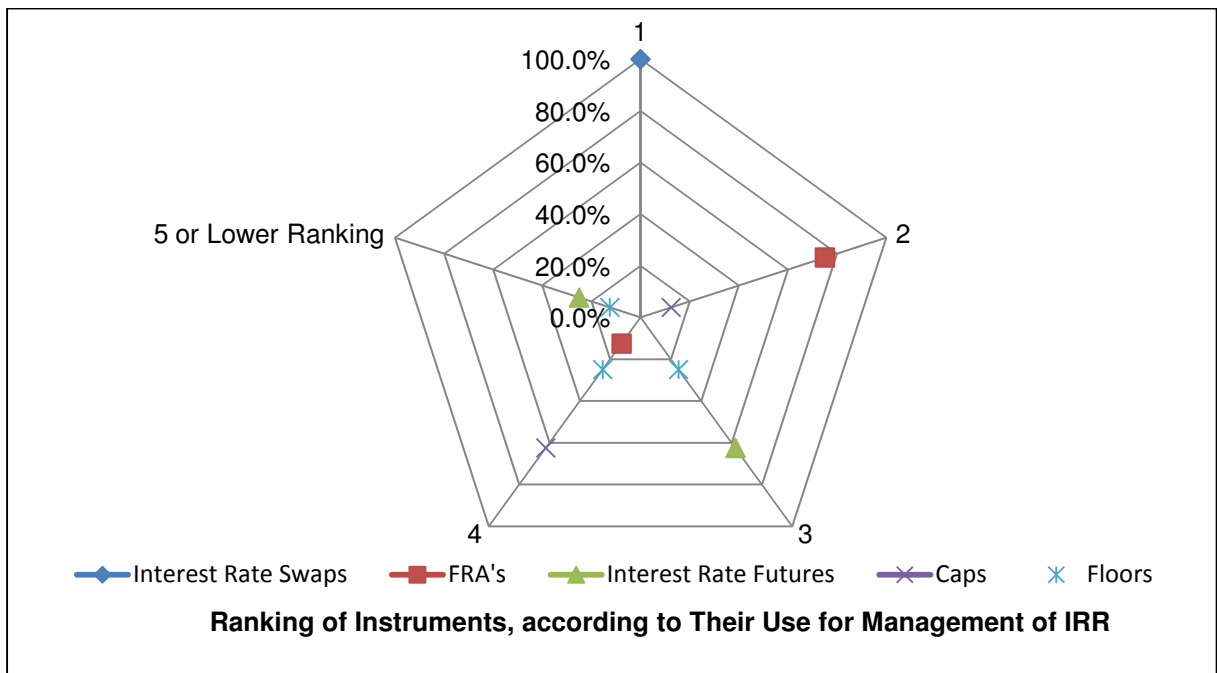
One way to mitigate financial risk is through the use of financial derivative instruments, in which the underlying asset is either an interest rate such as the JIBAR or assets associated

with interest rates such as bonds. New risks can be brought into the total risk of the banking portfolio due to the use of financial derivatives, as their trading values fluctuate and are driven by market forces.

9.1 Risk Mitigation Tools against Banking Book IRR

In a multiple-choice question, respondents were asked to rank a predefined set of instruments according to their use in IRR management. Figure 6.36 reveals that all banks rank interest rate swaps as the first choice, while seventy five per cent rank FRA's as the second most used instrument to mitigate banking book IRR. Respondents (sixty three per cent) rank interest rate futures and caps as the third and fourth most used instrument respectively. Other instruments include floors but these are not used extensively.

Figure 6.36 Risk Mitigation Tools against Banking Book IRR



Note: All figures are rounded. The base year is 2009. 1 means most used; 5 means least used. Note that the response of an individual bank may be included in more than one category.

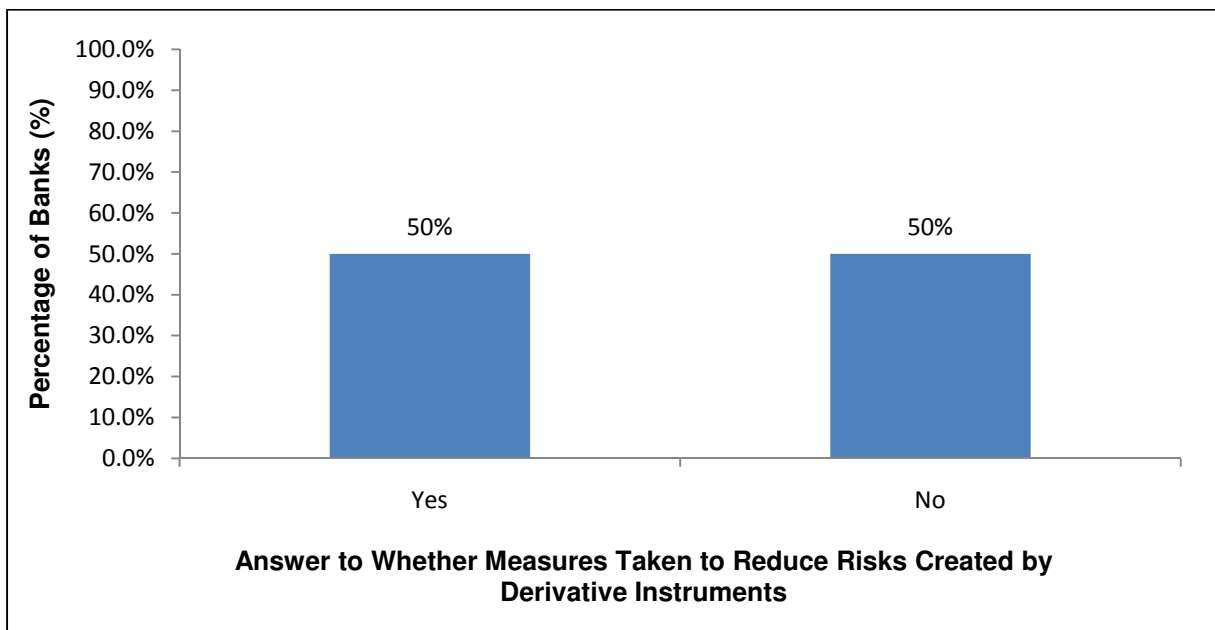
9.2 Measures to Reduce Derivative Risks

Respondents were asked in a close-ended question to indicate whether the bank has taken any measures to reduce the risks created by derivative instruments. Figure 6.37 illustrates that fifty

per cent of banks have taken measures to curb derivative risks through measures such as stringent risk limits, avoidance of risky instruments, alignment of accounting and economic substance of hedge items with hedges, and the risk-offsetting against other instruments.

The remaining fifty per cent of banks did not take any measure to reduce derivative risks. The reasons for their practices include instruments deployed specifically for risk minimization purposes as opposed to trading, and no or limited exposure to derivative transactions.

Figure 6.37 Measures to Reduce Derivative Risks



Note: All figures are rounded. The base year is 2009.

Banking book IRR can be minimised to the banks' desired level in line with their different risk tolerances and risk limits during a particular period of time. If actual loss consistently exceeds the risk limit, effective monitoring and reporting functions have to be in place to ensure risk management results are delivered to higher management for correctional measures. This is discussed in the following section.

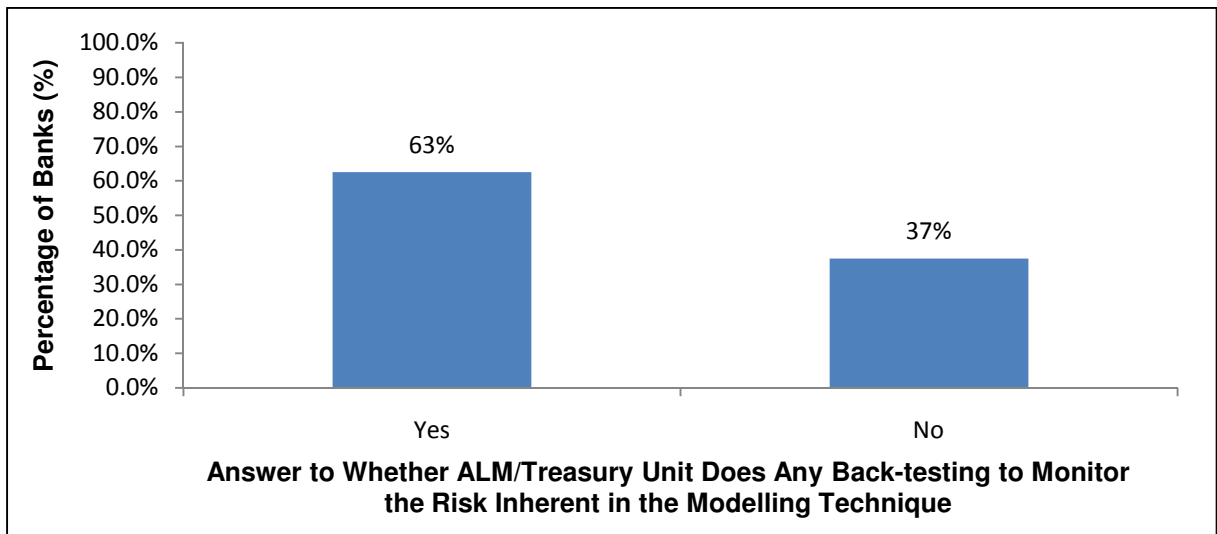
10. RISK MONITORING AND REPORTING

Risk monitoring and reporting activities are collaborated between business units, the risk management committee and the board of directors of a bank. As expectation rarely matches future realised outcome, effective monitoring and reporting measures ensure the optimal performance of the risk management process.

10.1 Risk Monitoring

In a close-ended question, respondents were asked to indicate whether the ALM or Treasury unit does any back-testing to monitor the risk inherent in the financial risk modelling technique (such as GAP Analysis and VaR). Figure 6.38 shows that sixty three per cent of banks whose ALM or Treasury unit does back-testing to monitor risk inherent in their modelling techniques that are used to model financial risks.

Figure 6.38 Risk Monitoring of Measurement Tools



Note: All figures are rounded. The base year is 2009.

Those five banks that have a back-testing procedure in place were then asked in an open-ended question to briefly describe how their back-testing procedures are carried out.

As shown in Table 6.7, the back-testing is carried out through similar procedures among banks through the comparison between expected and realised outcome. Standard practices are to compare pro-forma results of simulation with actual outcome, income volatility predictions against actual result, or historical data imported into the back-testing model that will predict income and cash, against actual income and cash, in order to determine the efficiency of risk management models.

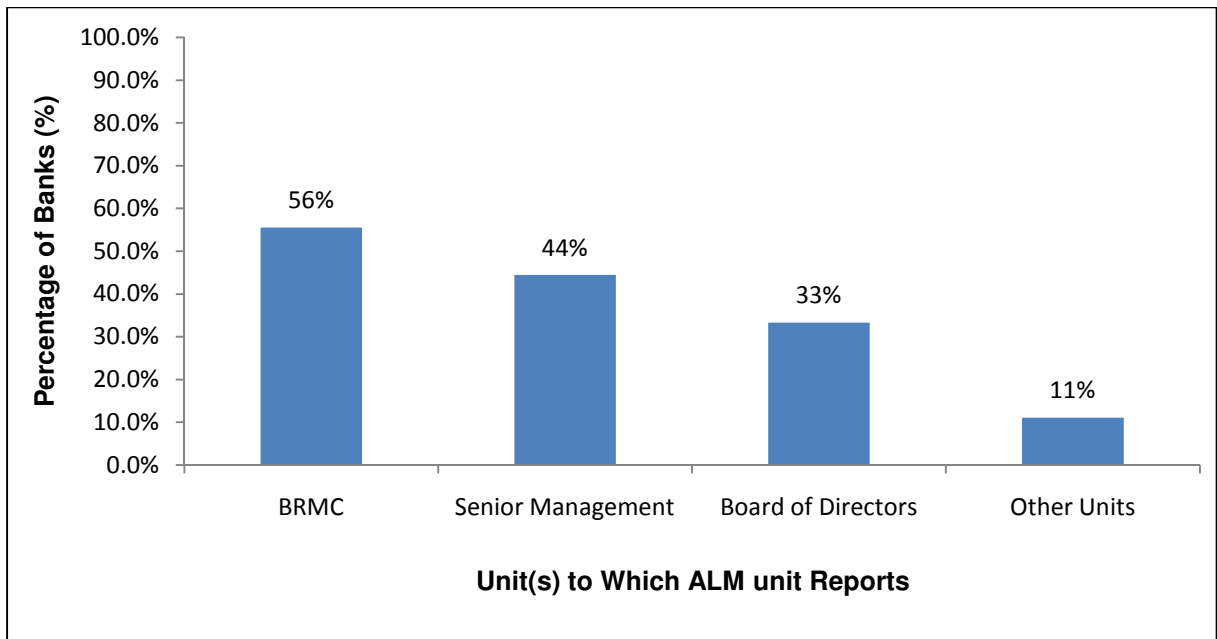
Table 6.7 Key Elements of Back-testing Procedure

Respondent Banks (bank names are not mentioned for confidentiality reasons)	Key Elements of Back-testing Procedure
Bank One	Comparison between pro-forma results of simulation and actual outcome
Bank Two	Testing of income volatility predictions against actual volatility
Bank Three	Assumptions used in the modelling process are back-tested, monthly, quarterly and annually
Bank Four	Historical data is imported into a model that will predict income and cash which is then compared with actual income and cash to determine the efficiency of the models
Bank Five	All variables are back-tested on a prioritization basis

10.2 Risk Reporting

A bottom-up reporting link typically exists between senior management of the business unit, the ALM unit, BRMC or ALCO, and the board of directors of the bank.

In a multiple-choice question, respondents were asked to indicate to which unit the ALM unit reports. ALM units (fifty six per cent) report to BRMC, and forty four per cent report to senior management, while thirty three report directly to the board of directors as shown in Figure 6.39.

Figure 6.39 Unit to Which ALM Reports

Note: All figures are rounded. The base year is 2009. Other units include Balance Sheet Management and ALCO. Note that the response of an individual bank may be included in more than one category.

As part of the BRMC, one bank's ALM unit is directly accountable to the board of directors, while another bank's ALM unit is part of Balance Sheet Management who then reports to ALCO.

At the end of the risk management process, the bank capital management unit is responsible for allocating a percentage of risk-weighted assets as a capital buffer for potential loss in future. Risk aggregation appears to be an issue when consolidating all types of risks in the bank. This is discussed in the next section.

11. CAPITAL MANAGEMENT AND RISK AGGREGATION

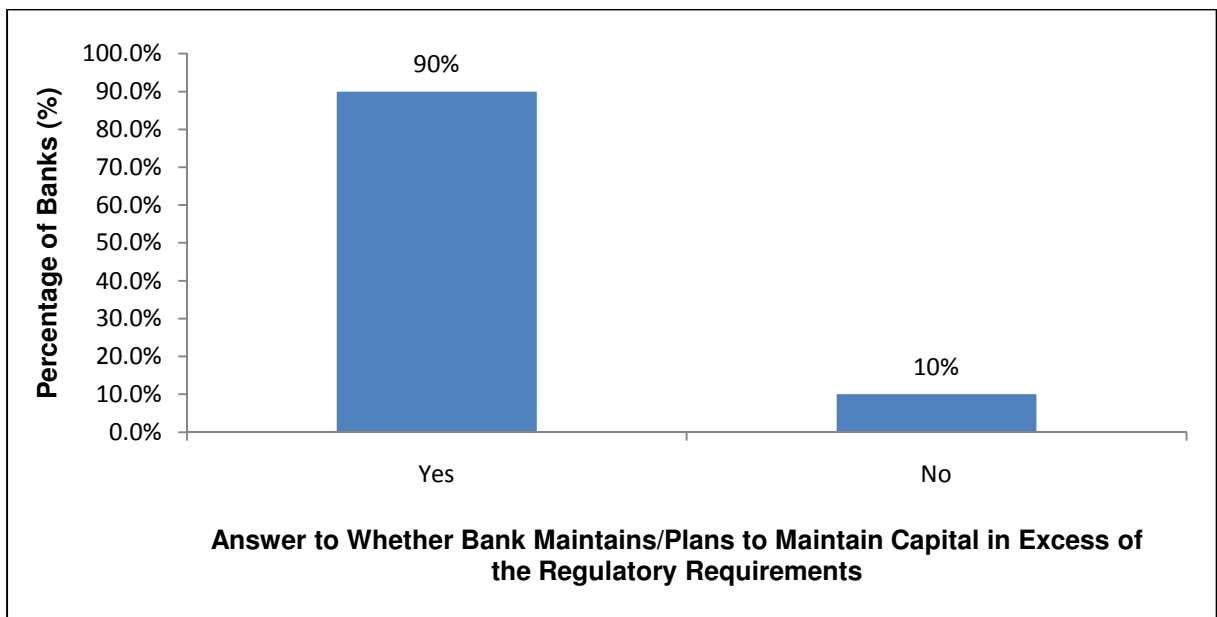
The types of risk to which banks are exposed differ, and each type of risk is allocated a percentage of the banks' capital reserve depending on the banks' risk management policy and/or strategy. Banks may choose a higher than required capital reserve by Basel II due to their excessive exposure to certain types of risk. The national banking regulator may also prescribe a higher capital reserve for local banks if needs be. In South Africa, banks are required to reserve a minimum of 9.5 per cent of its total risk-weighted assets as a buffer for potential losses in future, due to expected and unexpected market events. Compared to other

types of risks, IRR including banking book IRR is generally allocated a lower proportion of reserved capital than other risks, due to its low impact on the NII variance.

11.1 Capital Reserve

Respondents were asked in a close-ended question to indicate whether the bank maintains or plans to maintain capital in excess of the regulatory requirements. Figure 6.40 shows that ninety per cent of banks maintain and/or plan to maintain capital in excess of the required minimum of 9.5 per cent. The bank that does not reserve more than 9.5 per cent believes that banking book IRR compared to other risk types like credit risk is very small and therefore no additional capital is necessary.

Figure 6.40 Capital Reserve for Banking Book IRR

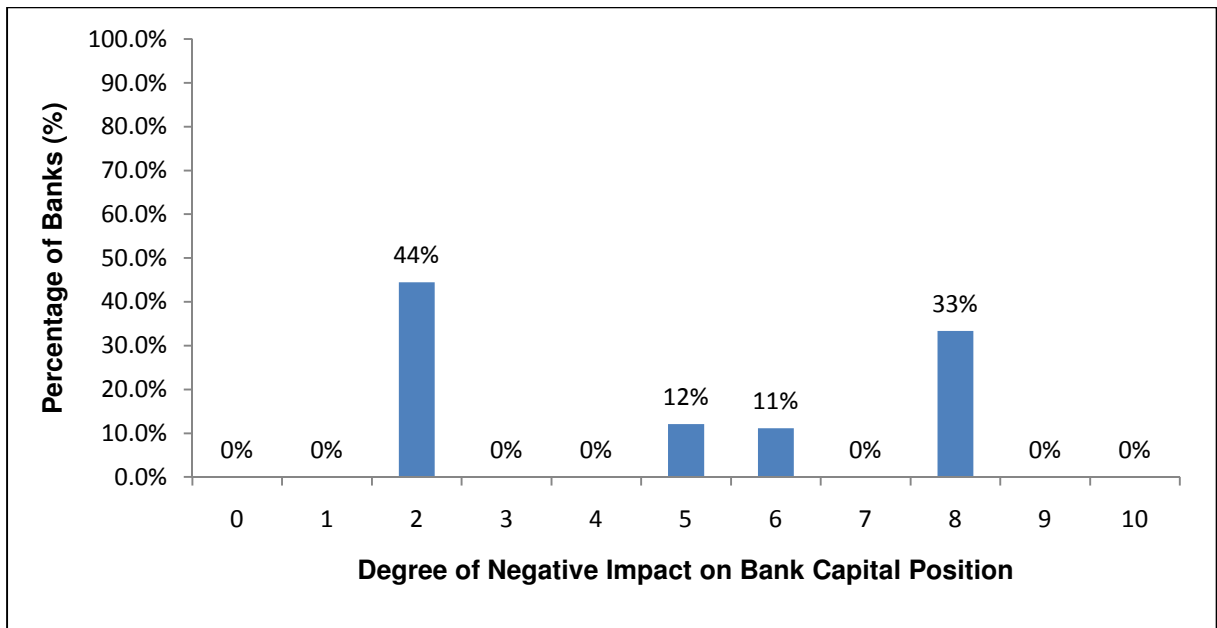


Note: All figures are rounded. The base year is 2009.

11.2 Impact of SIRR on Bank Capital Position

Respondents were asked on a scale of attitude between zero and ten to indicate the degree of impact of SIRR on the capital position of the bank. Figure 6.41 indicates that forty four per cent of banks give a score of two to indicate that they do not agree (i.e. agree less than fifty per cent of the time) that SIRR impacts negatively on the capital position of the bank. In comparison, forty four per cent of the banks give a score of six or higher to agree that SIRR has a negative impact on the bank’s capital position.

Figure 6.41 SIRR Impacts on Bank Capital Position



Note: All figures are rounded. The base year is 2009. 0 means no impact while 10 means high impact.

12. THE USA SUBPRIME CRISIS AND ITS IMPACT ON BANK MANAGEMENT IN SOUTH AFRICA

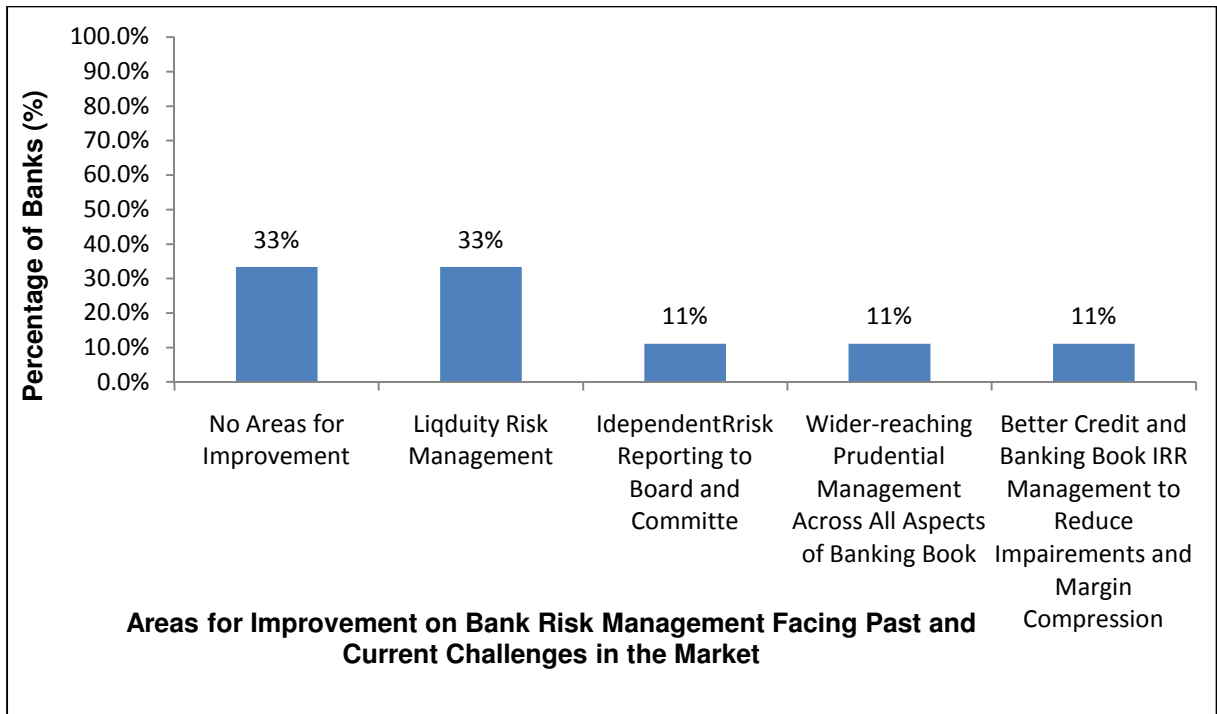
The subprime financial crisis, due to the housing loan market in the USA, has adversely impacted on the financial services and other industries in the USA and globally. To date, several multinational banks have filed for liquidation, as loan assets became illiquid as a result of a sharp increase in the subprime interest rate causing borrowers to default, as well as a decline in property prices and the write-off of non-performing loans within a short period of time.

Banks in South Africa may use knowledge of the crisis to better manage and prevent interest rate, liquidity and credit risks in future. Other types of risks, such as operational and model risks, are areas for improvement in risk management PPS.

Considering these events, respondents were asked in an open-ended question to indicate what they would do differently now relating to bank risk management. Figure 6.42 shows that thirty three per cent of banks believe that no areas for improvement or policy changes are needed on banking book IRR, as their banks are not (overly) exposed to the fallouts of the subprime crisis. This is due to the fact that bank business and/or the South African financial

system were not as involved in subprime lending activities as some of the foreign banks.

Figure 6.42 Areas for Improvement on Bank Risk Management



Note: All figures are rounded. The base year is 2009.

Banks (thirty three per cent) believe that it is imperative to improve liquidity risk management. Of the banks, twenty two per cent recommend that in future banks should focus on liquidity management by either paying more attention to long-term liquidity or tightening up liquidity management. Some (eleven per cent) of them suggest that banks should implement a higher frequency (daily) of liquidity risk reporting, more stringent stress-testing scenarios, and new risk management methodologies.

Once again, eleven per cent of banks suggest that with hindsight, had South Africa known of the negative economic consequences and rapid decline in interest rates as a result in the first half of 2009, credit risk and banking book IRR could have been appropriately enhanced to reduce impairments and margin narrowing.

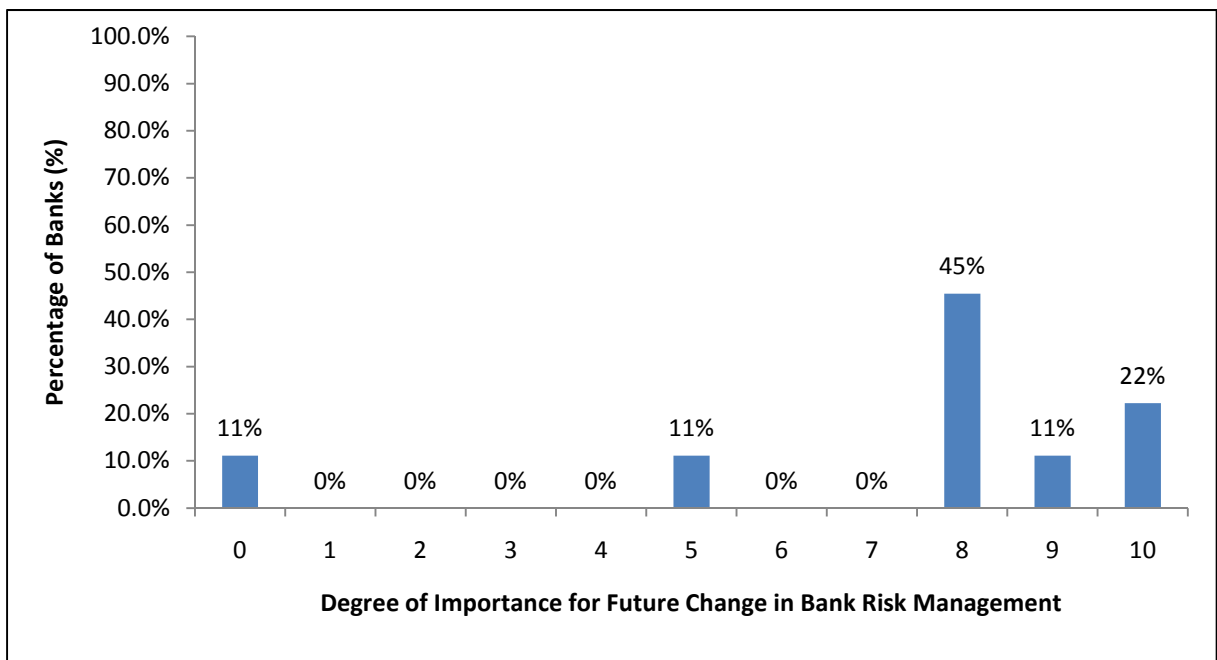
Some other respondents (eleven per cent) recommend the establishment of a wider-reaching prudential management approved by the board across all aspects of the banking book IRR management, resulting from the liquidity and rate pressure in the market. Another eleven per cent of banks believe that risk must be independent and risk management results should be

reported to an independent board committee.

Respondents were asked to indicate on a scale (from zero to ten) how important the sub-prime crisis will be for future changes in bank risk management. Figure 6.43 illustrates that seventy eight per cent of banks, with a score of 8 or higher, agree (more than fifty per cent of the time) that subprime risk was important for changes in bank risk management in future.

One respondent pointed out that the financial crisis highlighted the fact that banks are exposed to systemic risks over which they have no control. This raises the need for stress-testing and scenario modelling.

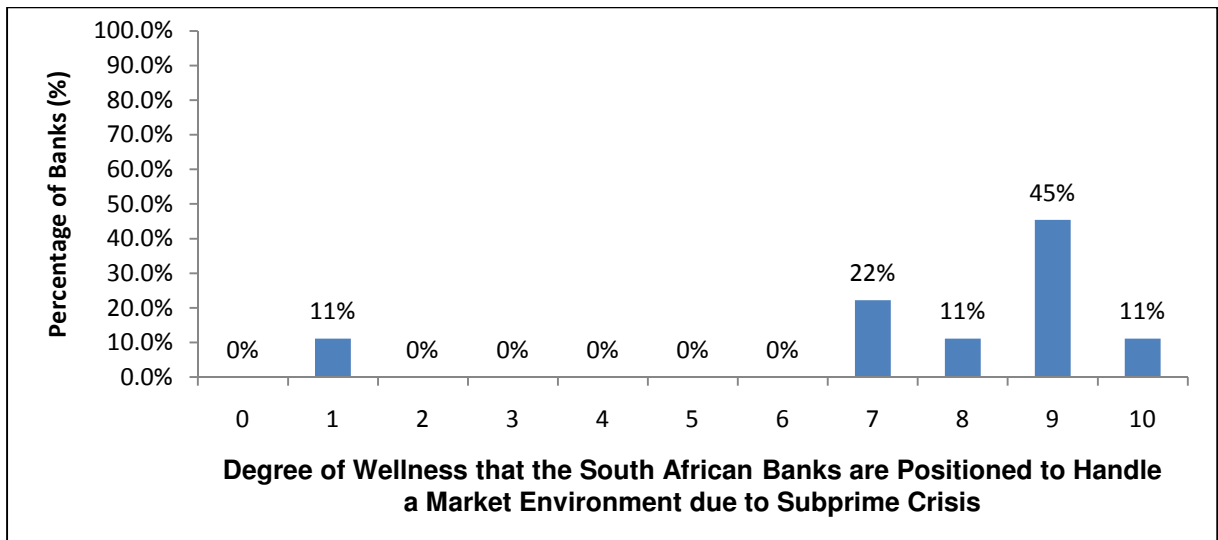
Figure 6.43 Future Change in Bank Risk Management



Note: All figures are rounded. The base year is 2009. 0 means not important while 10 means very important.

With the subprime crisis in mind, respondents were asked to indicate the degree of wellness, on a scale between zero and ten, that the South African banks are positioned to handle such a market environment. Figure 6.44 illustrates that eighty nine per cent of banks with a score of seven or higher believe (more than fifty per cent of the time) that the South African banks are well positioned to handle a subprime crisis.

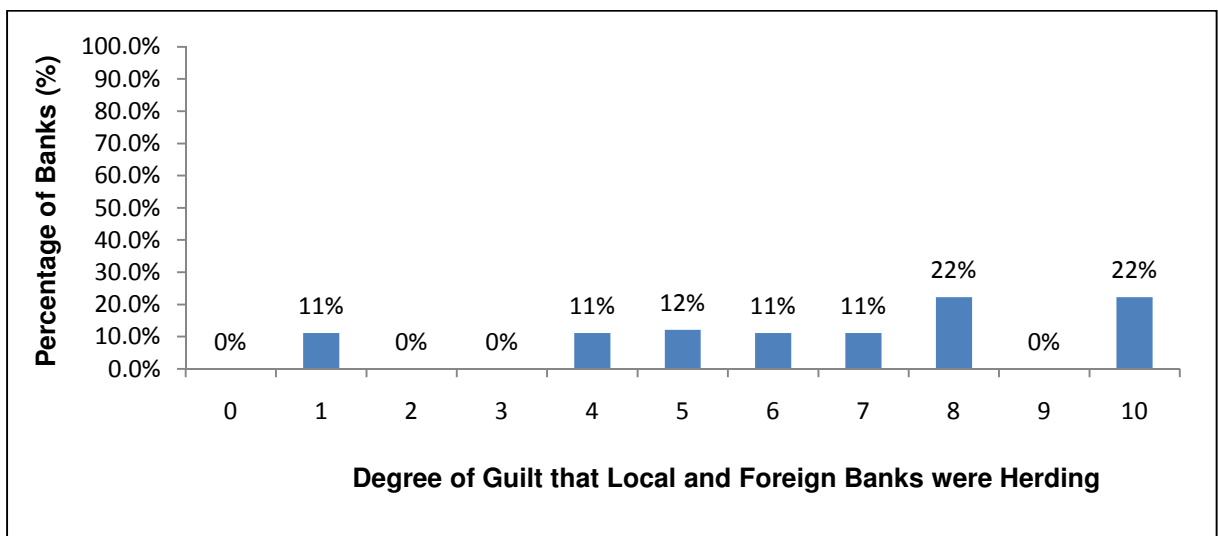
Figure 6.44 Ability of South African Banks' to Weather Subprime Risk



Note: All figures are rounded. The base year is 2009. 0 means not well at all while 10 means good.

Respondents were asked on a scale (from zero to ten) to indicate to what extent the local and foreign banks were guilty of herding (following each other as it relates to behavioural finance). Figure 6.45 illustrates that sixty six per cent of banks agree (more than fifty per cent of the time) that local and foreign banks were guilty of herding as it relates to subprime loan transactions, causing dramatic and adverse impacts on the slow-down of the global economy. One respondent believes that foreign banks are more prone to herding than local South African banks, as they are more involved in subprime loan transactions.

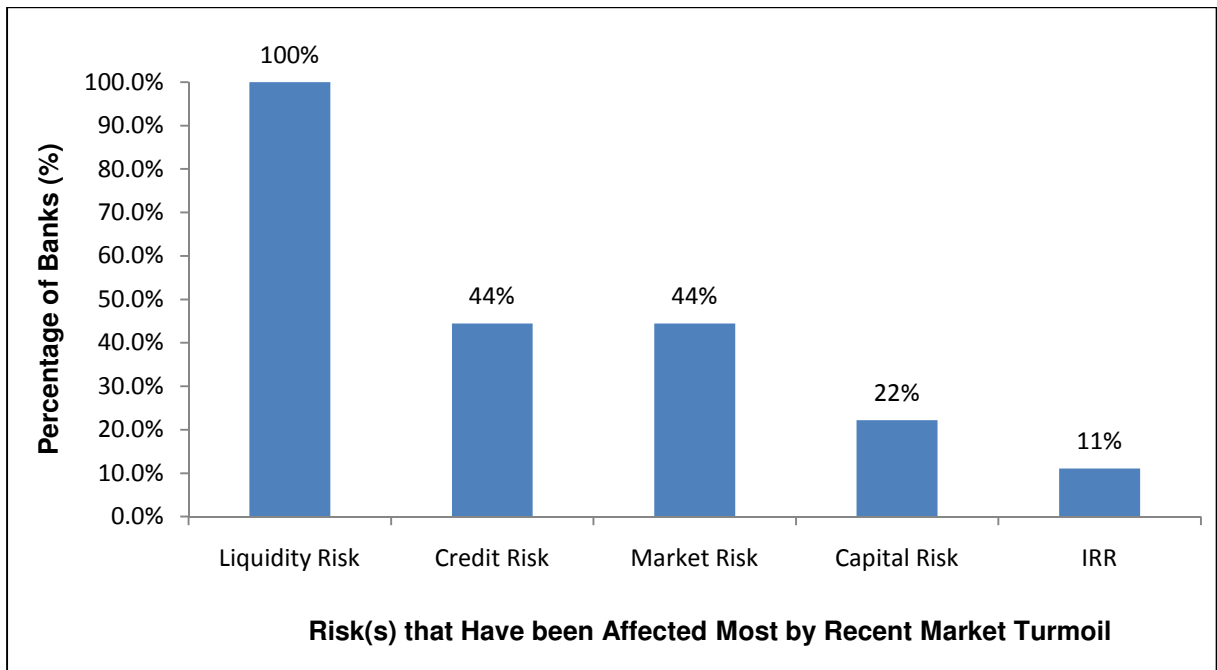
Figure 6.45 Herding of Local and Foreign Banks



Note: All figures are rounded. The base year is 2009. 0 means not guilty while 10 means very guilty.

In a multiple-choice question, respondents were asked to indicate which risk(s) have been affected the most by the recent market turmoil. Figure 6.46 shows that all banks believe liquidity risk is most affected by the subprime crisis. Of the respondents, forty four per cent include credit risk and market risk respectively, while only eleven per cent believe that IRR is one of the risks that is affected the most.

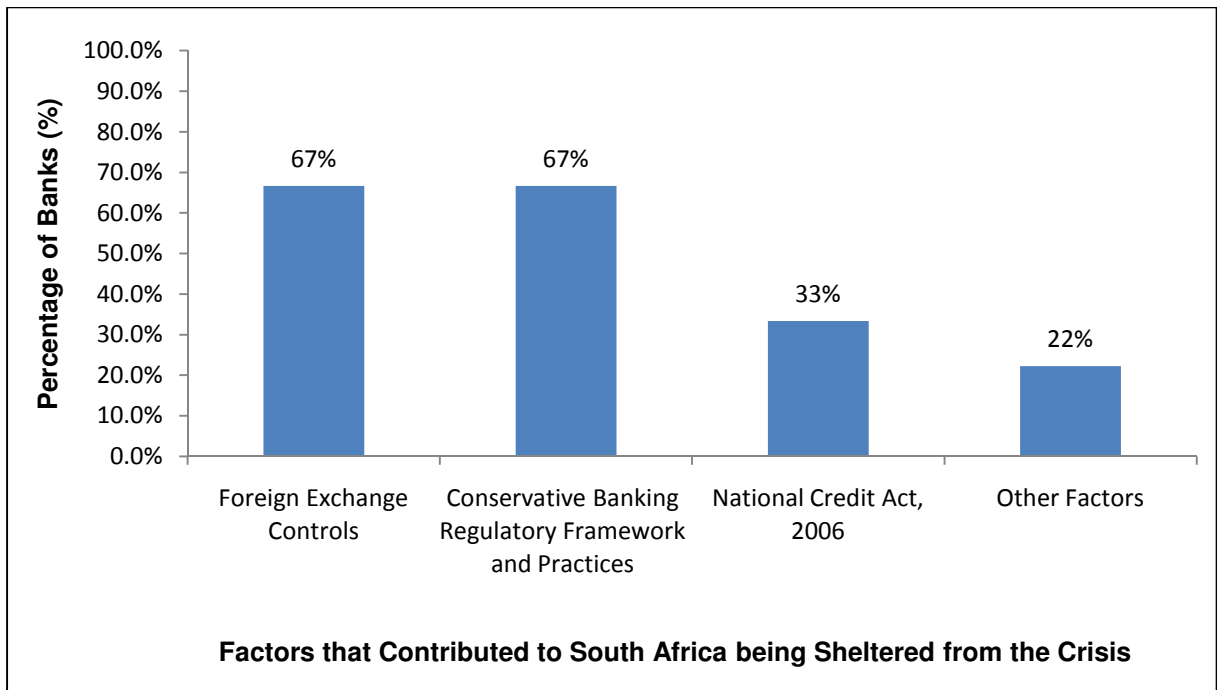
Figure 6.46 Risk Affected Most by Subprime Crisis



Note: All figures are rounded. The base year is 2009. The response of an individual bank may be included in more than one category.

Respondents were asked in an open-ended question to indicate which factors contributed to South African banks being sheltered from the crisis. Figure 6.47 indicates that sixty seven per cent of banks include the foreign exchange policy and the conservative banking regulatory practices respectively in South Africa as one of the main factors that sheltered South Africa from the subprime crisis. Examples include conservative policy implementation and view on capital, conservative credit policies, vanilla-based products, and lower volume of securitization than overseas banks. The respondents (thirty three per cent) also included the National Credit Act (2006) as one factor. Other contributing factors include limited gearing in local banks, substance over risk management within local banks, and banks being more risk averse.

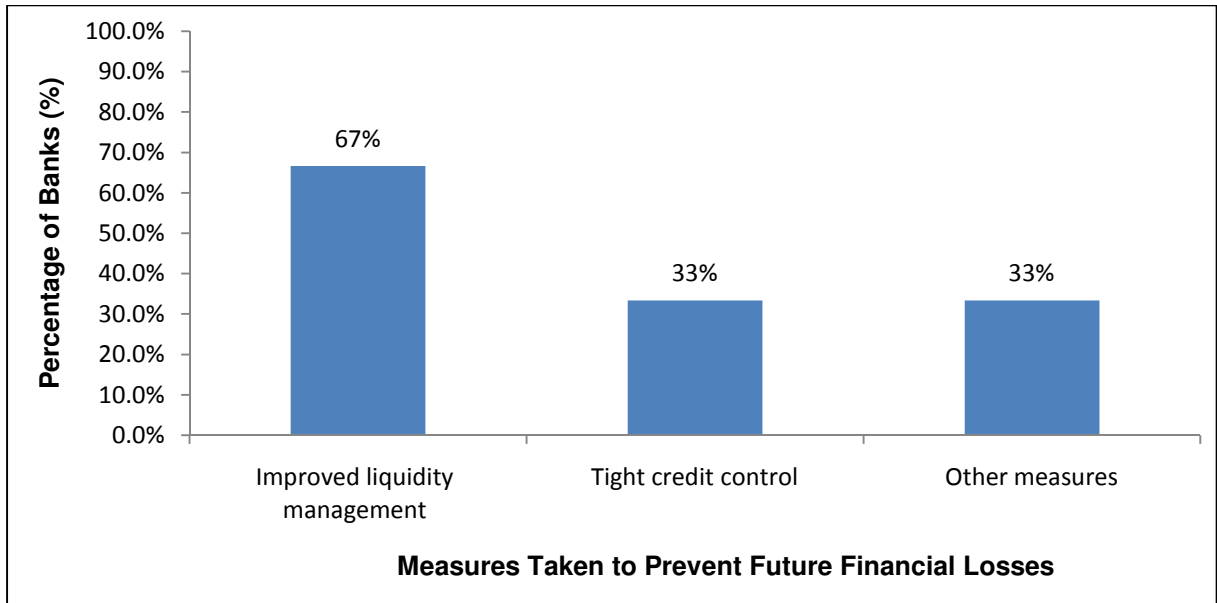
Figure 6.47 Factors that Sheltered South Africa from Subprime Crisis



Note: All figures are rounded. The base year is 2009. Other factors include limited gearing in local banks, substance over risk management within local banks, and banks being more risk averse. Note that the response of an individual bank may be included in more than one category.

In an open-ended question, respondents were asked to indicate what measures had been taken in their banks to prevent future financial losses, based on the lessons learnt from the global financial crisis. Figure 6.48 illustrates that sixty seven per cent of banks believe in improved or tighter liquidity management, while thirty three per cent of banks believe that tighter credit control are measures that have been applied by their banks to prevent future financial losses. Other measures include updated policies and procedures, ensuring independence of risks, prudential management policy and concentration management.

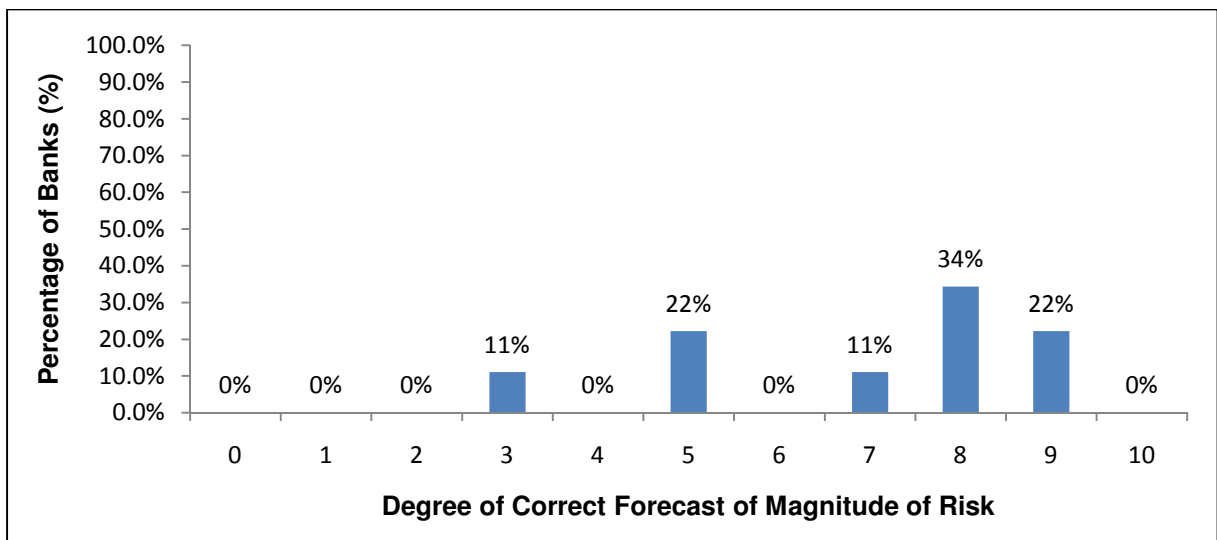
Figure 6.48 Measures Taken to Prevent Future Financial Losses



Note: All figures are rounded. The base year is 2009. Other measures include updated policies and procedures, ensuring independence of risks, prudential management policy and concentration management. Note that the response of an individual bank may be included in more than one category.

Respondents were asked to indicate on a scale (from zero to ten) to what degree banks are generally correct about the magnitude of risks to which they are exposed. Figure 6.49 indicates that sixty seven per cent of banks believe (more than fifty per cent of the time) that they are generally correct about their risk magnitude.

Figure 6.49 Correct Forecast of Magnitude of Risk

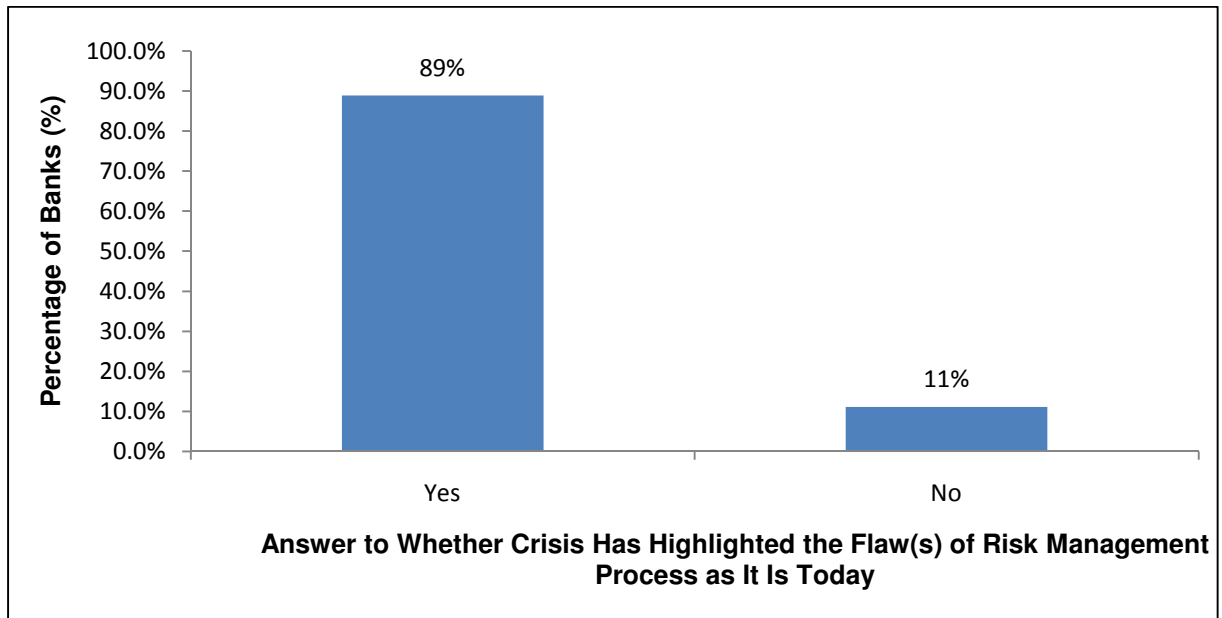


Note: All figures are rounded. The base year is 2009. 0 means not correct while 10 means accurate.

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In a close-ended question, respondents were asked to indicate whether the crisis has highlighted the flaw(s) of the risk management process as it is today. Figure 6.50 illustrates that eighty nine per cent of banks agree that the crisis has highlighted such flaw(s).

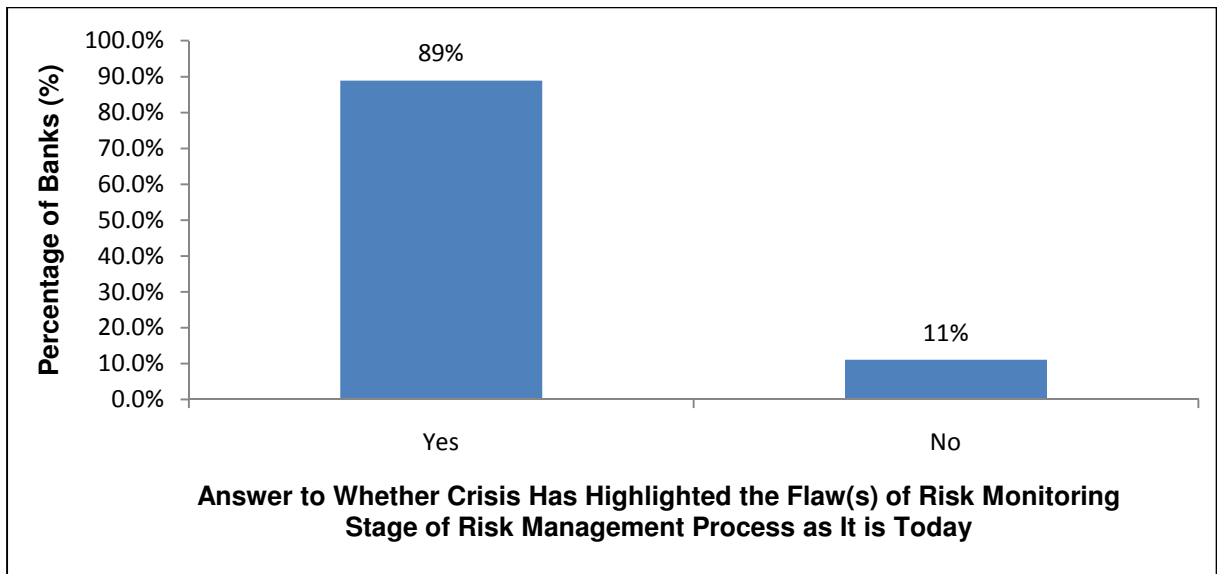
Figure 6.50 Flaws of the Risk Management Process



Note: All figures are rounded. The base year is 2009.

Similarly, in a close-ended question, respondents were asked to indicate whether the crisis has highlighted the flaw(s) of the risk monitoring stage of the risk management process as it is today. Figure 6.51 shows that eighty nine per cent of banks agree that the crisis has highlighted such flaw(s). One respondent specifically indicated that the flaw(s) of risk monitoring resides with the international banking regulation.

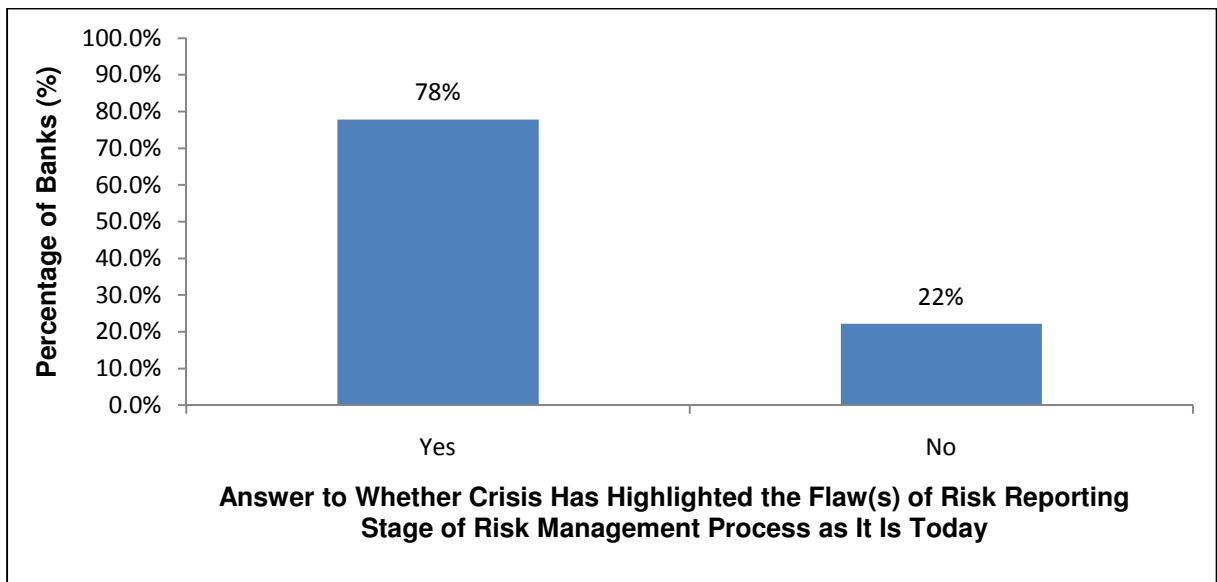
Figure 6.51 Flaws of Risk Monitoring



Note: All figures are rounded. The base year is 2009.

Respondents were then asked to indicate whether the crisis has highlighted the flaw(s) of the risk reporting stage of the risk management process as it is today. Figure 6.52 indicates that seventy eight per cent of banks agree that the crisis has highlighted such flaw(s).

Figure 6.52 Flaws of Risk Reporting



Note: All figures are rounded. The base year is 2009.

The last section of the questionnaire asked respondents to provide additional comments on bank IRR management. One respondent made several comments on the South African banks'

exposure to banking book SIRR, which was that the banks' exposure to SIRR is largely as a result of a large portion of their variable assets being priced at the prime overdraft rate versus deposits that are fixed-rate. Furthermore, the reprice to call rate and three-month JIBAR (adjustable-term deposits, fixed deposits or negotiable certificate of deposits) has impacted the market. This risk was managed through JIBAR-linked swaps. However, the study focuses on subject portfolios that contain only fixed-rate loans, advances and floating rate (including JIBAR-linked) deposits, which is exposed to losses due to uncertain repo-rate adjustments throughout a year. The respondent also mentioned that South African banks do not write off a large volume of fixed-rate assets, while repricing risks are managed through interest rate swaps (three-month JIBAR as the underlying rate).

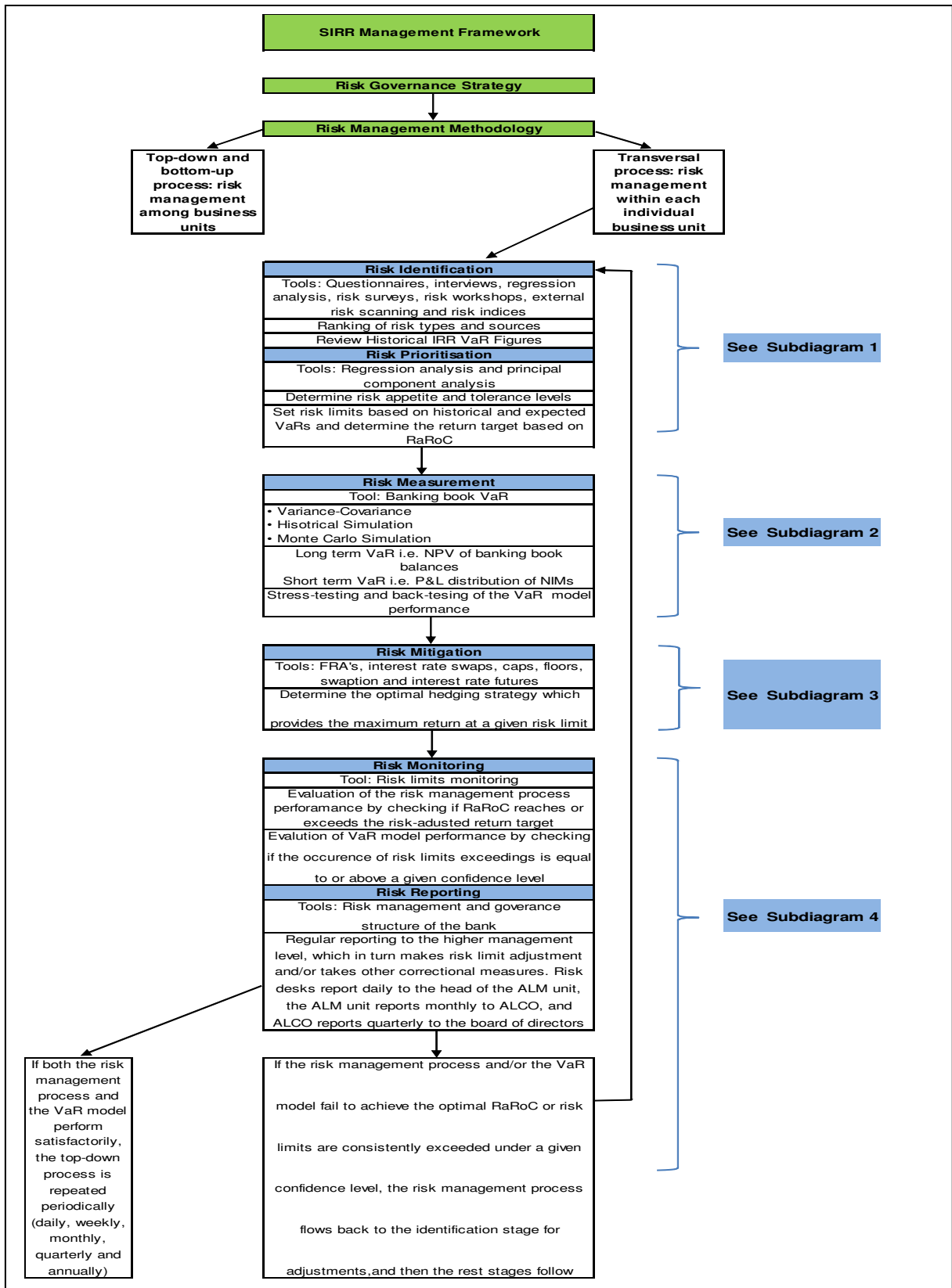
The next section is devoted to illustrating, in broad terms, the outline of a proposed model that may be used to manage SIRR. The empirical findings in this research indicated that at least half of the respondents saw the need for such a process or model. Due to limited studies on the SIRR process itself, the development of an initial framework is subject to further research in future.

13. THE SIRR MANAGEMENT FRAMEWORK PROCESS

A framework process is developed for banking book SIRR, which aims to manage inflation as a source of risk. In the remaining part of the chapter, the process framework is simply referred to as "the process". The overall process can be adapted to suit specific requirements of individual banks to also manage other risks in the South African banking sector. This section aims to give an overview by briefly describing the stages and tools used. The subsections explain each stage of the process in more detail.

As shown in Figure 6.53, the feedback-loop or transversal process flows top-down from the risk management strategy and methodology to monitoring and reporting, where the risk governance strategy and methodology feeds into the transversal process. Whenever risk-return outcomes deviate from initial targets, due to underperformance indicated by VaR and/or the process as a whole, the logic reverts back to risk identification where reassessment takes place and correctional measures are undertaken.

Figure 6.53 SIRR Management Model Process



Risk identification and prioritization tools include the examination of the bank's risk tolerance, historical IRR VaR numbers, risk factor ranking and the principal component and regression analyses. The goal of this stage is to have a clear understanding of the risks to which banks are exposed, which are then taken into account to determine risk tolerance and limits.

From the risk identification, the next step in the process has to do with risk measurement, where three methods of VaR are used to determine an average for both long term VaR and short term VaR based on banking book figures. This helps determine the expected risk limits. Moreover, back-testing is used to supplement VaR and to mitigate the shortcomings of the VaR approach of reduced accuracy in a highly volatile market environment. Stress-testing aims to determine the most likely magnitude of IRR by assigning probabilities to a set of extreme market scenarios.

The next step in the process involves risk mitigation, aiming to determine an optimal risk hedging strategy to achieve the risk-return target. However, this topic falls under trading book risk management and does not fall within the scope of this study.

Risk monitoring and reporting is the last stage of the process. Underperformance of the VaR model and the process as a whole can be effectively monitored by means of comparing expected RaRoC with realised RaRoC and the back-testing of the VaR model. Monitoring results are reported periodically to management within a business unit, BRMC and the board of directors, as stipulated in the risk management policy or strategy. When there is any significant and consistent mismatch between expected and realised outcomes, the process loops back to risk identification for correctional measures when deemed appropriate.

The next section explains the first stage in more detail.

13.1 SIRR Identification and Prioritization

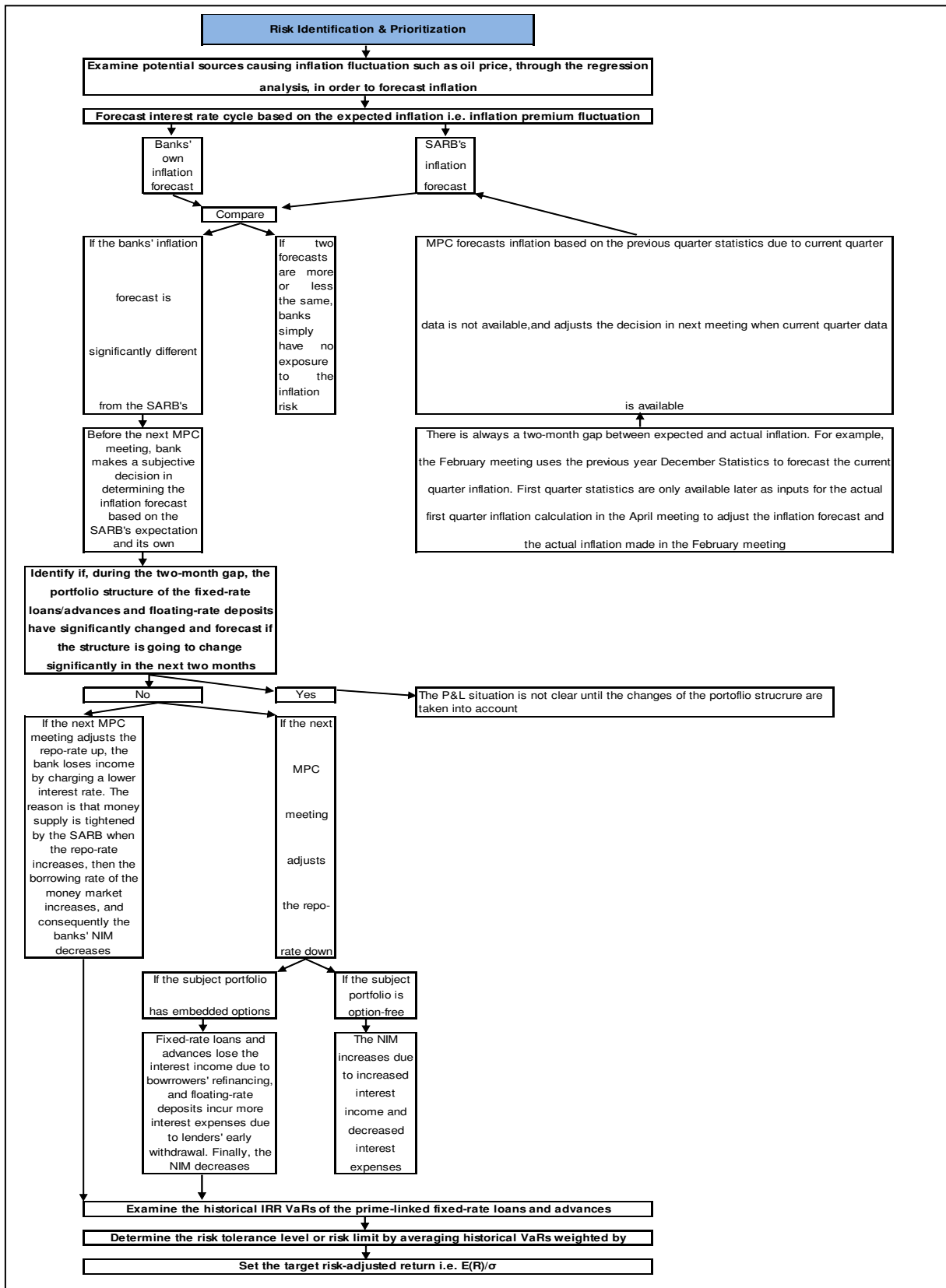
Figure 6.54 illustrates the first stage of the process which defines the factors causing banking book SIRR. One factor contributing to this is the actions of the SARB through the monetary policy. Uncertainty of repo-rate movements may result in bank financial losses, as monetary policy aims to control inflation by adjusting the repo-rate. More specifically, a two-month time gap between the release date of inflation forecast and actual inflation of each quarter

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exists. Fixed-rate loans issued within this two-month period will be incorrectly priced and will lead to a loss of income. The repo-rate change is based on the expected inflation rate; it rarely reflects the actual inflation rate. However, in the case of variable rate loans, banks can adjust the loan rate if the repo-rate changes.

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Figure 6.54 SIRR Identification and Prioritization (Sub-diagram 1)



The remaining part of this section explains the steps through which risk identification and prioritization are undertaken within the stage. This also sets priorities for risk measurement in the next stage.

Traditional econometric analysis is used to identify the magnitudes contributing to changing inflation, as well as the way in which interest rates are impacted as a result. For example, major independent variables (risk sources) that explain the dependent variable (inflation) include the oil price, trade deficit and currency depreciation. The inflation forecast can be achieved through regression analysis, estimating the effect of independent variables on a dependent variable. The potential independent variables are monetary policy, fiscal policy, private consumption, world oil price, trade current account and the exchange rate. Expected inflation, represented by CPI or CPIX is factored into the interest rate forecast³ in the next step.

The Fisher Effect formula is used to forecast the interest rate. The nominal interest rate is equal to $(1 + \text{risk-free interest rate}) \times (1 + \text{inflation premium})$, where the inflation premium is a major component of the nominal interest rate. Similar regression analysis should be conducted to capture the residual risk premium, which is the minor amount that the Fisher Effect formula fails to produce. This residual risk premium can easily be captured through the error term generated in many econometric programmes such as Eview and Stata.

As was illustrated and mentioned before, two inflation forecasts are involved, that of the bank inflation and the SARB's official inflation forecast. The SARB inflation forecast is released at MPC meetings throughout the year, and the forecast for a current quarter is based on statistics (prices of a basket of goods) released in the quarterly bulletin of the SARB in the previous quarter. For example, the February MPC meeting in the current year uses the previous year's December released statistics as inputs to do the inflation forecast. Two months later, the MPC meeting will be able to calculate the actual February inflation rate by adjusting the February forecast inflation figure, since the actual statistics for the first quarter in the current year is released in March. The SARB inflation adjustment two months later is inevitable, since forecast and actual inflation numbers are rarely the same. Therefore, prior to the next MPC meeting, banks need to compare their own inflation forecast with that of the SARB. If a bank's own inflation forecast is significantly different from SARB's, then there will be an

³ For further information about IRR expectation refer to Malz (2003).

IRR exposure when the MPC meets two months later and makes the actual inflation adjustment. The bank should make an adjustment of its inflation forecast based on its own current inflation forecast and the one from the SARB. This can be achieved by identifying whether there was a significant change in the portfolio structure of prime overdraft-linked fixed-rate loans, advances and floating-rate deposits during the preceding two-month window. Additionally, the bank will forecast if the subject portfolio structure is going to change in the next two months.

If a bank expects a significant change in portfolio structure two months later, the P&L situation is not clear until the actual changes of portfolio structure are taken into account. However, this falls outside of the scope of this study. Currently, there are two loss scenarios that are obvious. One scenario is that if a bank expects a significant change in portfolio structure, loss in NIM or asset value will occur if the next MPC meeting adjusts the repo-rate up. In this case, banks should review the historical VaRs of the subject portfolio to form an idea of the historic IRR exposure. This helps forecast and determine the risk appetite, tolerance and limit for the following period in a year by calculating the weighted average of historical VaR figures. The weights used in the weighted average calculation are the corresponding portfolio values. The last step is to set target returns, which the bank will achieve in the following period. The length of the period varies from bank to bank, but should be limited within a year for SIRR management.

The other loss scenario occurs when the next MPC meeting adjusts the repo-rate downwards, and if assuming portfolios with embedded options, NIM will decrease due to borrowers' prepayment and depositors' early withdrawal activities. In this situation, steps for risk identification are the same as those in the first scenario, namely, reviewing of historical VaRs, determination of the risk appetite, risk tolerance as well as target return for the next period. Target return is based on risk limits and risk-adjusted return criteria.

13.2 SIRR Measurement

Risk limits in the first stage are determined based on historical and expected VaR numbers at the risk measurement stage. VaRs will also be referred to in the following stages of the process. For instance, hedging strategies are based on the magnitude of VaRs to execute transactions in order to maintain exposure within risk limits. The comparison of actual VaRs

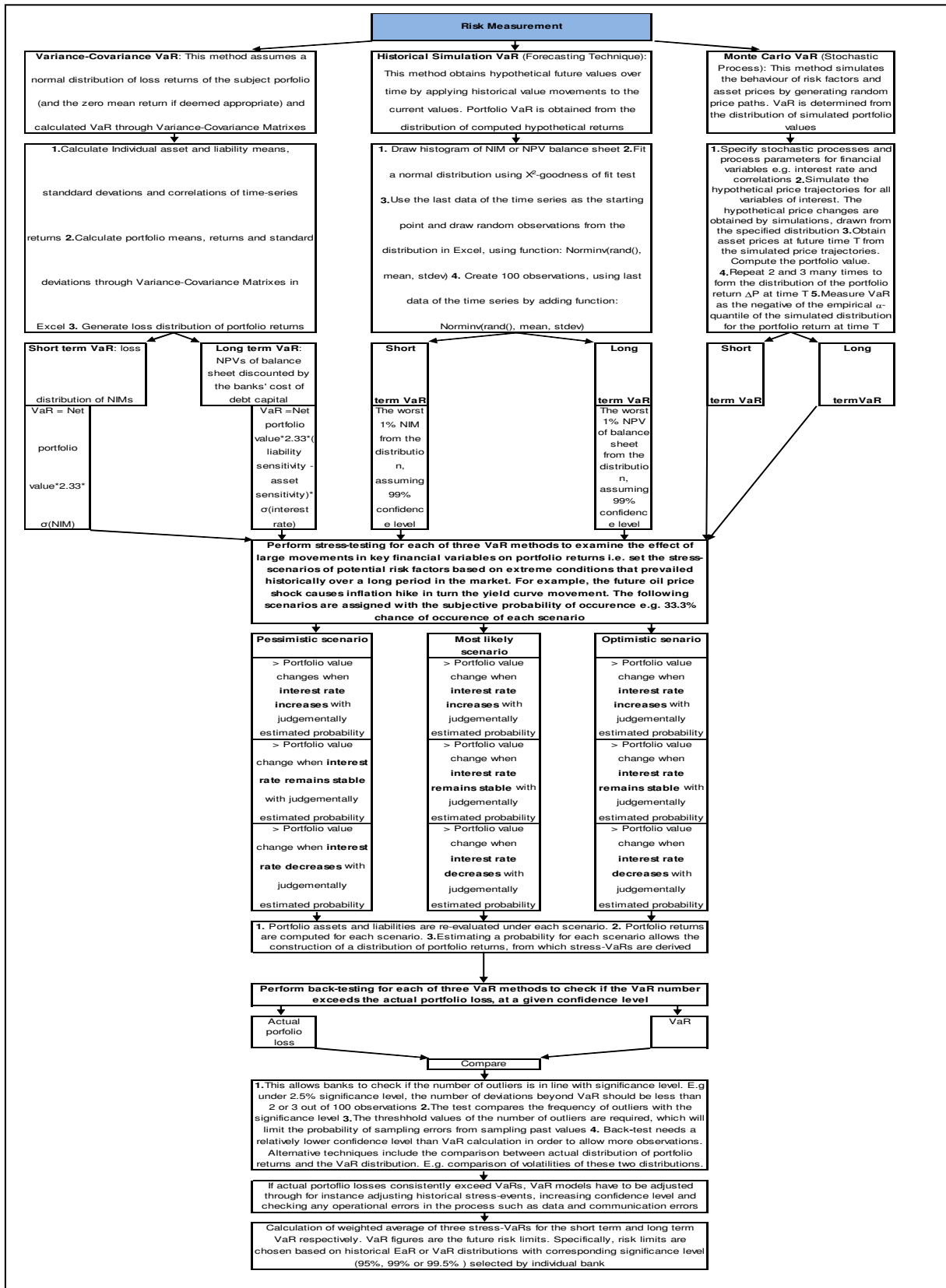
with risk limits is required in the monitoring and reporting stage.

As illustrated in Figure 6.55, three approaches to VaR calculation (Variance-Covariance, Historical Simulation and Monte Carlo Simulation) are considered, as the current practice has not yet made extensive use of VaR for banking book IRR. Three approaches are applied to calculate both short-run and long-run VaR, where short-run VaR is based on NIM and long-run VaR is based on NPV of the balance sheet. In addition, the detailed procedures of each VaR method are followed routinely as per their mathematical definitions.

To supplement the shortcomings of VaR under extreme loss-events, stress-testing is necessary, where a series of historical stress-events are taken into account to form various scenarios with assigned, although subjective, probability of occurrences. For instance, the 97/98 Asian financial crisis, the 2001 September 11 terrorist attack, and the 2007 subprime loan crisis. Loss of income of the current portfolio is estimated based on historical loss with the addition of risk premiums to the expected return. Probabilities are assigned to three scenarios (pessimistic, most likely and optimistic). Under each scenario, there are three sub-scenarios of repo-rate movements (increase, remain stable and decrease), leading to different portfolio P&L's.

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Figure 6.55 SIRR Measurement (Sub-diagram 2)



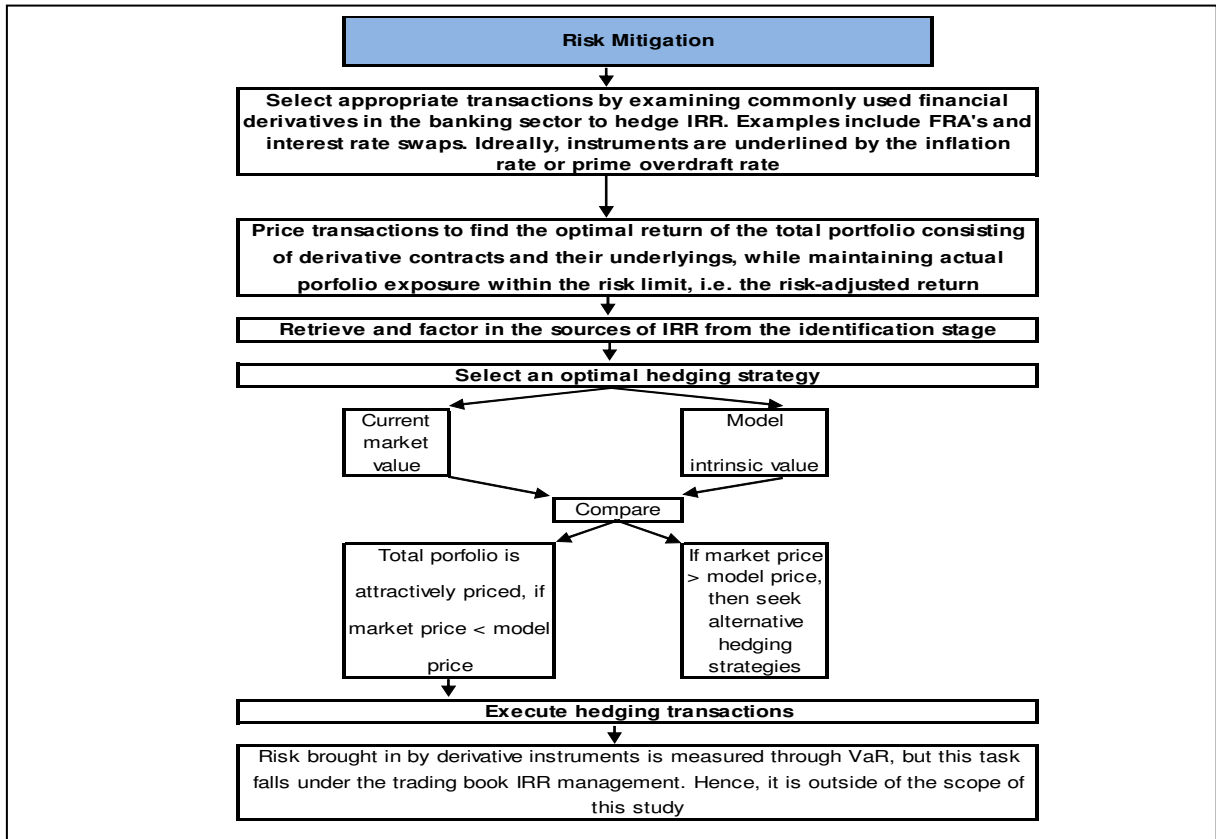
Similarly, probabilities are allocated for each sub-scenario under each main scenario. To ensure the satisfactory performance of VaR, back-testing should be carried out, where the (left) downside tail of VaR distribution is examined by comparing actual portfolio P&L with expected VaR. If there is a consistent mismatch between P&L and VaR under a predefined confidence level, VaR will be adjusted through measures such as changing historical stress-events and confidence levels, or checking any operational (data and communication) error that falls under the operational risk management, which is not within the scope of this study. In order to obtain a more accurate forecast of risk exposure in future, final short-run VaR and long-run VaR are determined as the weighted average of the stress-VaRs in different scenarios respectively.

13.3 SIRR Mitigation

Derivative hedging at transaction level, and pricing and valuation of instruments are discussed only briefly in this section, as it is outside of the scope of this study.

As illustrated in Figure 6.56, interest-rate derivatives such as interest-rate swaps and FRA's, based on prime overdraft rate underlying assets, are optimal to mitigate IRR caused by inflation and repo-rate rate movements. This is due to the fact that a constant relationship exists between repo-rate and prime overdraft rate. After the selection of appropriate instruments, an optimal risk-return profile is determined by estimating the maximum return of the total portfolio consisting of derivative instruments and their corresponding underlying assets, with minimum risk (i.e. VaR within risk limits). When appropriate hedging instruments are selected and risk-return targets are determined, the third step is to incorporate risk sources identified in the first stage of the process, in order to form an optimal hedging strategy and to achieve the risk-return target sought. In other words, the portfolio value is recalculated by taking into account possible future changes in these risk sources. The optimal risk hedging strategy is then based on a comparison between the intrinsic value and the market value of the total portfolio. If there is no such total portfolio traded on the market, a comparable portfolio with an underlying asset that is closely substitutable for the desired one should be selected. Fourthly, if the market value is lower than the intrinsic value, the total portfolio is under-valued and hedging strategy should be executed, as it is cheaper to enter the transaction.

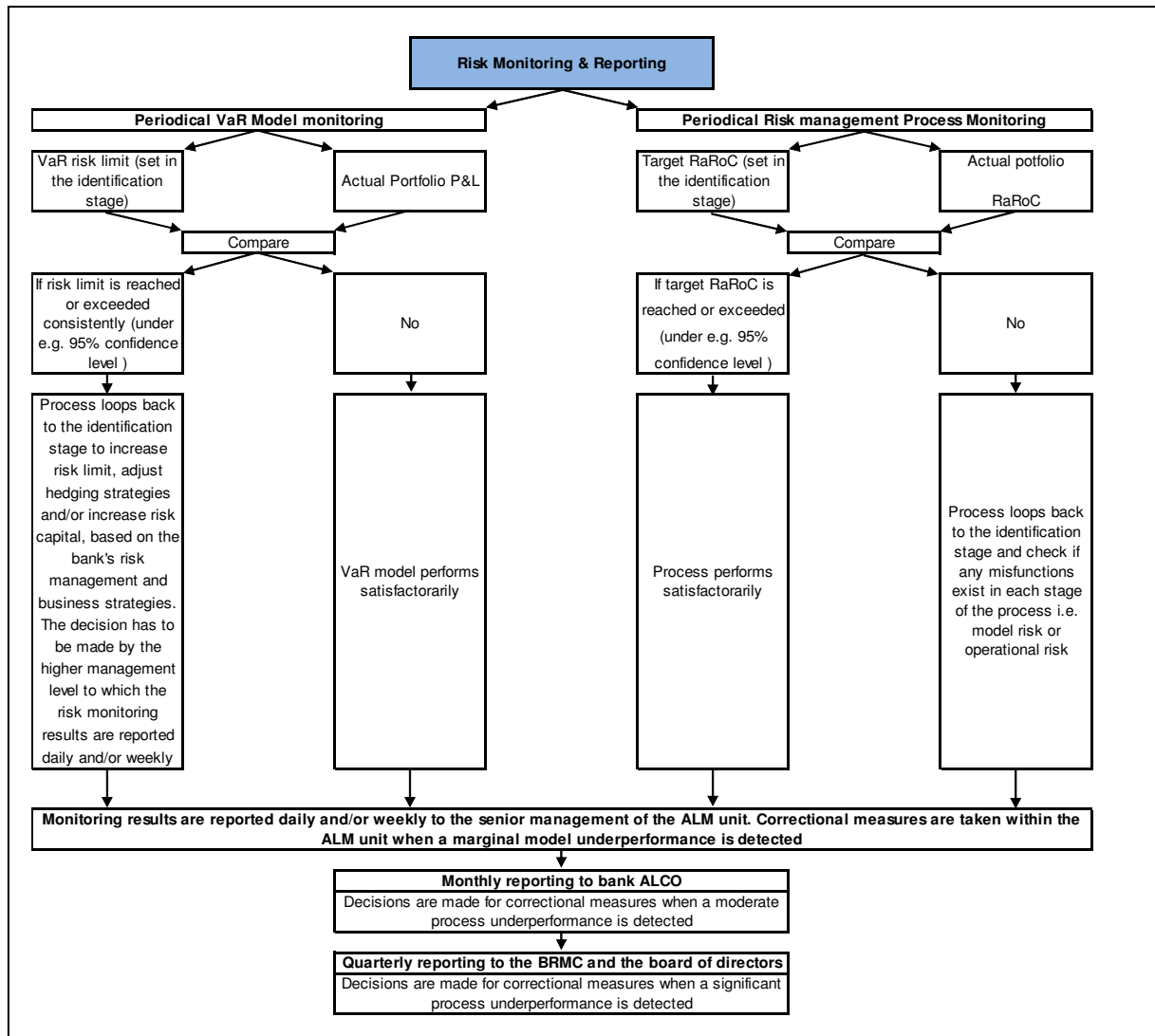
Figure 6.56 SIRR Mitigation (Sub-diagram 3)



13.4 SIRR Monitoring and Reporting

As illustrated in Figure 6.57, the risk monitoring stage consists of two parts. One part is to monitor the performance of VaR through back-testing, which deals with the risk limit issue. The other part is to monitor the SIRR management process as a whole, which deals with risk-return target issues. The two parts are explained in detail below.

Figure 6.57 SIRR Monitoring and Reporting (Sub-diagram 4)



To monitor VaR model performance, a periodical comparison of actual P&L with risk limits is required. For instance, the hypothesis that the VaR model performs satisfactorily is rejected under a ninety five per cent confidence level. In other words, risk limit has been consistently exceeded during the monitoring period of ten days, assuming a ten-day VaR is applied. Then, the process loops bottom-up to risk identification where correctional measures are undertaken or the process is reviewed. For example, a combination of measures that can be taken are to increase risk limits, adjusting the hedging strategy, raising risk capital to increase previously under-estimated risk, or reducing total portfolio risk through a new hedging strategy. However, such decision has to be made at senior management level within the ALM unit of

the bank, to which monitoring results are reported on a daily and/or weekly basis.

Similarly, the SIRR management process is monitored through the periodical review of realised RaRoC against target RaRoC as specified in the risk identification stage. The same statistical method is applied, and if banks are ninety five per cent confident to say that RaRoC target is not achieved, the process loops back to the identification stage in order to check if any existing processes malfunction between stages and/or within each stage. However, this task falls under the function of operational risk management, which is out of the scope of the study.

In terms of risk reporting, choosing correctional measures can be made at the ALM unit level, when a minor process under-performance is detected and reported daily and/or weekly. For a moderate under-performance, the decision of correctional measures has to be made at the bank ALCO level, where the reporting period is on a monthly basis, except that an unexpected loss-event or other urgent situation requires immediate decision-making. For a major model under-performance, the result has to be reported quarterly to BRMC and board, except if an unexpected loss-event or other urgent situation requires immediate decision-making.

SUMMARY AND CONCLUSION

Some South African banks have developed their own risk management PPS based on international principles, practices and standards or internally developed policies and benchmarks. Large banks tend to have a more complex risk management process, coupled with more advanced risk management techniques than smaller banks.

Large banks have aligned their risk management policies and strategies with international principles and standards such as Basel II and the “Principles for the Management and Supervision of Interest Rate Risk”. Alternatively, small banks rely on internal control and a risk management manual, as they cannot afford expensive risk management models similar to those of large banks.

Most local banks follow a procedure based on a top-down and bottom-up decision-making process and/or a procedure based on corporate or risk governance principles. However, none of them have had a process in place that links key elements (risk identification, risk measurement, risk mitigation and risk monitoring and reporting) together to form a feedback

loop process within the banking book and/or general IRR management unit, which confirms one of the research problems raised in the study.

In general, IRR is a key risk type in commercial banks, as they are engaged in the borrowing and lending activities. Small and medium banks have less sophisticated risk management systems than the large banks in South Africa. Their risk management is, to a large extent, based on historical risk events and managerial experience. Internal risk control measures are developed through strategic meetings and implemented throughout the bank. This is due to their smaller asset size and limited range of asset and liability products which leads to less exposure to IRR.

The majority of banks believe that the inflation rate is one of the main factors contributing to IRR or SIRR on the banking book. Sources of SIRR such as uncertain and frequent repo-rate adjustments by the MPC may cause financial loss in the subject portfolio consisting of fixed-rate loans/advances and floating-rate deposits. Even though there is a small proportion of bank assets tied up in fixed-rate loans and advances in South Africa, declining interest rates will result in the downside risk of repo- and prime overdraft-linked assets as well as the basis risk between assets written at prime overdraft rate versus deposits that reprice to call-rate and three-month JIBAR (either adjustable term deposits, fixed deposits or NCDs). The basis risk as part of IRR could also result in losses being incurred in the subject portfolio. However, this issue is outside of the scope of this study.

For large and medium banks, interest rate swaps, FRA's and interest rate futures are common instruments used to hedge against IRR. In terms of SIRR on banking book, risks can be mitigated through repricing to the three-month JIBAR via a liquid swap market. Risk measurement tools such as repricing GAP analysis, sensitivity analysis, VaR and EaR are often deployed to evaluate banking book IRR. However, small banks are not involved in derivative transactions but rely on the effect of portfolio offsetting and tying their interest rates to those of large banks. Small banks do not have sophisticated risk measurement tools such as VaR and GAP analysis in place, but rather rely on managerial experience and brainstorming, where decisions are made by reviewing historical events and forecasting future interest rate cycles. In addition, the majority of banks have not had tools in place to measure embedded-option risks.

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Most local banks have deployed stress-testing and back-testing procedures to improve the quality and accuracy of risk measurement, whereas testing procedures vary due to banks' different risk policies, measurement tools, models and risk limits. The ALM unit of banks report to BRMC, senior management and/or the board of directors, depending on an individual banks' corporate governance structure and policy statement. Moreover, most banks reserve a higher amount of economic capital than eight per cent required by Basel II, from which a certain, although low, proportion of their capital reserve is allocated for IRR.

Subprime risk occurred in the second half of 2007 onwards in the USA, which contributed to the financial crisis and then economic crisis internationally. Compared to other countries, the South African banking sector has been sheltered from such crisis due to its stringent foreign exchange control, conservative banking regulation and the new National Credit Act implemented in 2006. Even though IRR is the least affected type of risk during the crisis, banks have taken this opportunity to further strengthen their risk management through measures such as tight liquidity management and credit control, as well as wide-reaching prudential management to help prevent future financial losses.

Current practices are not in favour of managing SIRR separately from general IRR, but there is a 50/50 view on the imperative to develop a systematic process to manage new SIRR exposures such as SARB inflation targeting policy-induced IRR. Most importantly, the survey results have confirmed that there are other research problems which should receive attention. Examples are uncertain repo-rate movements and embedded-option risks giving rise to NIM loss (particularly in a declining interest rate environment) specifically as it relates to a portfolio consisting of fixed-rate loans and floating-rate deposits. Based on current practices together with risk management PPS locally and globally, the study proposed the broad outline of a SIRR framework process which may be used in banks in South Africa.

CHAPTER SEVEN: CONCLUSIONS AND RECOMMENDATIONS

1. INTRODUCTION

In South Africa, the SARB as bank regulator has implemented several guidelines, policies and acts such as the King II on corporate governance, and the South African Bank's Act and Credit Act, which govern the operation of commercial banks in South Africa. Related policies include foreign exchange control, inflation targeting and other monetary policies, which also have an impact on the risk management of banks. These regulations sheltered the country from the recent financial and economic crisis.

In line with international best practices, South African banks implemented the Basel II Accord in January 2008. Large banks have put in place the ERM framework, corporate governance, risk management policies and sophisticated risk management tools to control various risks. Examples of risk include: credit risk, market risk, operational risk and other unquantifiable risks such as reputational risk.

Since 2008, the banking sector in South Africa has maintained a higher capital ratio than the eight per cent required by Basel II. However, there has been a continuous declining volume of loans and advances since the second half of 2009. The contraction of the lending business seen by South African banks is attributed to the risk aversion of residential customers. Moreover the lending standards have also become strict after the financial crisis in 2007 (West, 2010a).

One key empirical finding in chapter six of this study is that there is a 50/50 view on the fixed-rate loans that are exposed to the repo-rate adjustment after the MPC meeting. This indicates that banks in South Africa have not yet realised the potential financial loss exposure due to the uncertain repo-rate cycle in the short term. As a result, there is a 50/50 view on the imperative to develop a SIRR management process to control such a repo-rate risk.

Another empirical finding is that risk measurement tools remain on the traditional repricing GAP and sensitivity analysis. With the increasing tendency of unexpected market factors, IRR may not be measured as accurately as in the past, although these measurement tools

themselves have flaws. For instance both sensitivity analysis and VaR are limited to a small change of the interest rate when testing such a change's impact on the value of the subject portfolio.

This study focused on the banking book IRR that falls under the market risk category. The subject portfolio consisting of fixed-rate loans and advances, and floating-rate deposits may be exposed to NIM loss. Such a loss results from the inflation targeting policy that has caused an uncertain repo-rate environment since 2006.

The remaining sections of this chapter cover solutions addressing the research problems, current IRR management practices and a new risk management framework to bridge gaps in current practices. Recommendations for future research are also considered.

2. REVISITING THE RESEARCH PROBLEMS

One research problem raised in the study is that the subject portfolio may be exposed to the uncertainty of repo-rate adjustments in the short term (two to three months). MPC meetings are drivers of changes in the repo-rate. Even though banks may have hedging instruments in place to counter risk, derivatives will increase the risk if the bank maintains open positions and makes a wrong forecast of the future direction of interest rate changes. Risk may also be brought about due to possible default or credit risk. Risk management with derivatives, however, falls outside of the scope of this study.

Another research problem is that all types of risk measurement tools have their shortcomings. This requires stress-testing and back-testing procedures to ensure the satisfactory performance of the risk management process as a whole. However, it came to light that most medium and small banks in South Africa have not yet deployed the advanced risk management tools such as repricing GAP and VaR. They rely on managerial experience and BRMC meetings to manage risks. These qualitative means of risk measurement will most likely produce unreliable results.

One argument as raised in the empirical finding is that fixed-rate loans and advances represent a small portion of the total assets in South African banks. Hence, banks are to a lesser extent exposed to financial losses due to the fluctuating repo-rate. However, the proportion of fixed-rate loans and advances is expected to increase in future. Due to the low rate of consumer

savings in South Africa, banks have to rely on the repo-market to fund their lending businesses. The repo-linked loans are mostly fixed rate; thus, borrowing from the repo-market will automatically increase the proportion of fixed-rate loans in banks.

The last research problem is how to manage the SIRR resulting from the repo-rate changes by linking key process elements: risk identification, measurement, mitigation and monitoring and reporting together in a systematic risk management process. With the expected declining and uncertain repo-rate environment in the near future, a subject portfolio (consisting of fixed rate loans and advances, and floating-rate deposits) is exposed to the potential losses resulting from the change in the repo-rate. This requires all banks to have a systematic process to manage such SIRR, especially when NIM losses are caused by the change of portfolio composition and possible repo-rate changes between two consecutive MPC meetings. A SIRR management framework process is proposed to solve all three research problems raised in the study through providing a detailed risk management procedure for each element of the process. This risk management process involves the banks' risk management strategy, policy, corporate governance principles, ERM, PPS and the current best risk management practices in order to help determine the optimal risk-adjusted return of the total portfolio.

3. WEAKNESSES IN CURRENT PRACTICES AND AREAS NEEDING IMPROVEMENT

Current banking book IRR management relies on mostly fragmented bank risk management systems, where each business unit of a bank operates more or less on its own, not as part of a linked, integrated and systemic process. This weakness of bank risk management greatly reduces the effectiveness and efficiency of managing risk where communications among different business units are essential. Risk at business unit level may be overlooked as overall exposure to risk is best managed at the highest level in the bank. Furthermore, most banks manage SIRR with the same procedure as the general IRR and do not foresee the SIRR as a significant risk exposure currently and in future. The current general IRR management procedure may not be adequate to control new market risk exposure and/or the exposure indirectly caused by the other risk sources.

Another weakness apparent in bank risk management is that stress-testing is often conducted with a very limited number of scenarios. This is due to the lack of risk professionals who have

such expertise to identify new stress-scenarios and monitor the performance of the bank risk management process. After the financial crisis in 2007, banks shifted their strategy to focus more on the stability of cash flows instead of profitability. To ensure stable cash flow, banks should continuously monitor their risk management processes to identify process defects and take correctional measures.

There are several areas needing improvement in future IRR management. First of all, risk managers should be given adequate authority and resources to control risks. Secondly, the risk management function should be treated as an essential part of bank business, and investments should be made to upgrade infrastructure and software to support it. Thirdly, since risk management departments (such as the treasury) are seen as cost centres, with risk management activities countering business development and profitability, banks should change their culture towards risk management in order to balance the trade-off between risk and return (Palazzolo, 2009) and in the process to improve the bottom line of the bank's income statement.

In South Africa, measures have been taken to improve the capital level and quality of liquid assets, as well as the implementation of prudential risk management practices. However, strict prudential management requires banks to increase the proportion of low interest yielding liquid assets, which may have a negative impact on the banks' profitability. Changing the balance sheet structure by increasing long-term borrowing would be a challenge for banks' risk management in future (West, 2010b). Therefore, it is inevitable that one risk management strategy may cause problems in other areas of bank risk management. The key is however to find the optimum point in the trade-off between two factors and attempt to align the bank's risk management strategy to achieve a result as close to the optimal point as possible. However, this strategic integration issue does not fall within the scope of this study.

Due to the limited literature and practices on the banking book SIRR management process linking key elements, i.e. risk identification, measurement, mitigation, and monitoring and reporting, this study proposed a broad outline of a framework for banks to use as a generic or basic model to guide their SIRR risk management process development.

4. RECOMMENDATION FOR FUTURE RESEARCH

As revealed in chapter six, half of the South African banks have not yet taken any measures to

reduce derivative risks in order to maximise the risk adjusted return of the bank's portfolio. This is due to the fact that many derivative instruments are merely used for hedging purposes as opposed to speculation in banking book IRR management. In future, risk mitigation functions could be more integrated between the trading book IRR and the banking book IRR. These instruments can simultaneously be used in the trading book, through which the total portfolio return is enhanced. However, this requires a close cooperation between the trading book unit and banking book unit, which is guided by one optimal hedging strategy to minimise the total portfolio risk. This may seem a complication in the short term, but will lead to the long term value creation of the bank. Ways to improve integration of systems and improving communication and analysis of banking book exposure may be considered for future research.

Apart from communication and system integration problems, the proper and meaningful use of modelling tools may also be a problem. The BRMC should verify whether the processes and tools are used correctly. This may require the monitoring of tools used in the risk management process including the stress-testing process, back-testing, VaR, and repricing GAP analysis, as well as the monitoring of process performance measures such as RaRoC and EVA. However, if there are no significant misuse of tools and processes, attention should be devoted to the other factors such as new and unexpected market forces and sources linked to the other risk types such as credit, operational and liquidity risks. This requires the collaboration of different risk management departments in the bank. The key factor important for the risk management process optimization is to minimize process variability, which reduces the operational risk due to human errors. Strategies to cut costs while reducing risks can be applied to streamline and speed up the decision-making process in order to improve the efficiency of the risk management process as a whole. Future research may focus on people, processes and systems errors by developing risk measurement tools to help banks improve the operating efficiency of their risk management processes.

The basis risk which is caused by loans and deposits being tied to different rates, is an important source of banking book IRR. For instance, prime overdraft rate loans and three-month JIBAR deposits may be in the subject portfolio. The basis risk of the different underlying rates lead to the banking book IRR in the declining repo-rate environment, as the prime overdraft rate has a fixed relationship with the repo-rate whereas the JIBAR does not. Future research may quantify the impact of the repo-rate changes on the subject portfolio

through the VaR and a historical time series analysis with the GARCH method.

In the declining repo-rate environment, options embedded in the fixed-rate loans/advances and floating-rate deposits may expose the subject portfolio to NIM losses. This is due to the opportunity cost of higher interest income and lower interest expenses, rather than if the repo-rate remains stable, *ceteris paribus*. At present, there are few banks, besides those small banks that are not exposed to embedded-option risks, measuring such option risks, and their approaches are often based on quantitative measures such as the regression analysis. A simulation technique including behavioural scenarios and probability of occurrence should be the focus of future research. Although it is difficult to measure option risks as they are dependent on changes in the market, increased accuracy of measuring option risks will greatly reduce total portfolio risk in the declining rate environment.

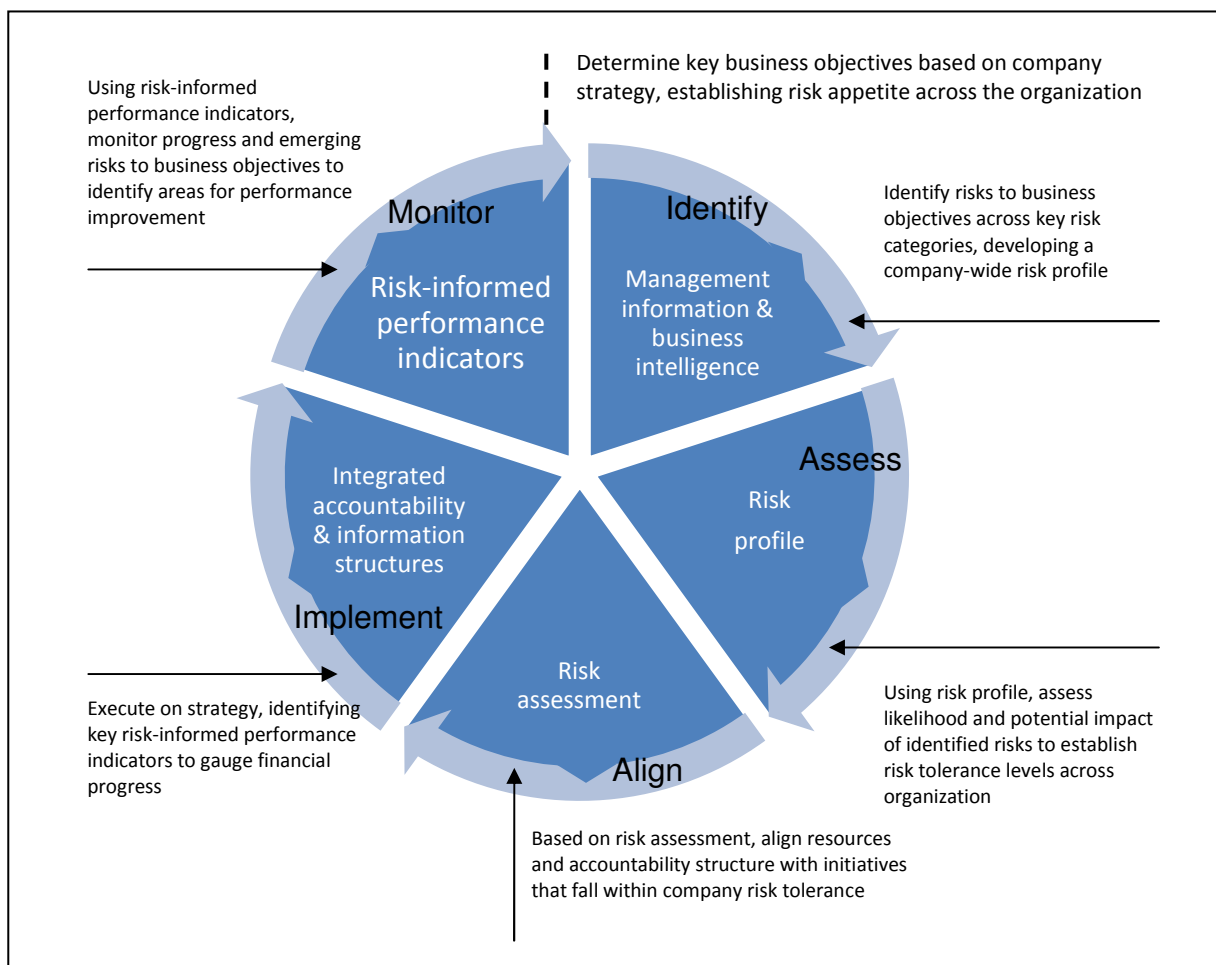
Risk aggregation is another issue that requires the attention of bank risk management. The aggregation of credit, market and operational risks, requires sophisticated quantitative models. The risk management process captures the cause-and-effect between risk sources and outcomes. However, the current practice is that banks build separate probability distributions for each risk type and then combine risks using a simple summation approach (Irim, 2001), where all risk numbers are summed up algebraically. This approach to risk aggregation could lead to the model risk and is an area for future research to develop a more robust method to aggregate risk across risk categories. For instance, by analyzing their degree of impact on the IRR, the IRR exposure caused by indirect sources such as liquidity and basis risk can be quantified through measures such as the regression analysis and the principal component analysis.

Facing a complex and fast-changing blend of technological, customer and regulatory risks, it is critical to align and link risk and performance management in a way that creates sustainable value for stakeholders of a bank and its clients. There is a renewed focus on both improving risk management capability and increasing the emphasis on board and executive oversight of risks. The core of good risk management includes elements that form its foundation. These include event identification, risk assessment, risk response and control activities (Atkinson, 2010). This is an area for future research to investigate the issue related to the integration of various risk management strategies and the integration of the risk management strategy and the general business strategy of the bank.

SIRR Management Process of Commercial Banking

Figure 7.1 illustrates that risk management is an integral part of organizational management to achieve business objectives. However, the risk management function should be integrated and aligned with performance objectives of banks. In other words, a risk informed decision making process is embedded in the banking operation so as to drive performance. For instance, risk management principles should be incorporated in the operational guideline of each business unit of a bank. However, a trade-off exists between unnecessary or unmeasured risk taking and easily quantified targets such as revenue or profitability (Bowers, Hamoir and Marrs, 2010). This is an area for future research to assess the corporate governance structure of the bank and evaluate how the integration of a risk management strategy into the bank's overall business strategy has an impact on the bank's profitability. However, proper implementation of risk management processes and procedures may often be hindered by marketing and political issues.

Figure 7.1 Enhanced Risk Management Process



Source: Atkinson (2010)

SIRR Management Process of Commercial Banking

With the South African economic recovery in 2010 and thereafter, the GDP growth rate is expected to reach its pre-crisis state (last quarter of 2007) by 2012. Under the positive and encouraging macroeconomic environment, the South African commercial banking sector will most probably continue its prudent risk management and the new risk management process will be implemented to help banks achieve their optimal risk-adjusted returns.

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ADDENDA

SURVEY QUESTIONNAIRE



Universiteit van Stellenbosch
University of Stellenbosch

Departement Ondernemingsbestuur
Department of Business Management

Dear Respondent,

Research Survey

Short-term interest rate risk (SIRR) has exposed banks in South Africa to the possibility of financial losses. One of the major factors that induced such SIRR is the South African Reserve Bank's inflation targeting policy that also indirectly causes other sources of IRR like basis risk. The uncertainty of the periodical adjustments in the repo-rate leads to net interest loss of the portfolio consisting of fixed-rate loans and floating-rate deposits in South African banks.

The objective of the research is to determine if respondents agree whether a SIRR management model should be developed to address the above problem and to suggest some important aspects that should be considered for such a model if needed. To this end this research attempts to gather information about the SIRR management process in banks and to identify any possible weaknesses in the current process. The information gathered will then be used to suggest a generalised SIRR management model for use by Treasury Departments and Asset-Liability Management (ALM) units of a bank.

This survey is carried out as part of a masters research dissertation and has the support of the University of Stellenbosch (Webpage: www.sun.ac.za) and the academic supervisor, Professor Johan van Rooyen (Email: jvrooyen@sun.ac.za; Telephone: 021-8082217).

In return for your participation the survey results will be forwarded to you once the research has been completed, if you are interested. Only overall information will be made known. Individual survey responses will be kept strictly confidential.

The survey consists of 11 sections and will take approximately 25 minutes to complete.

Thank you for your time and effort.

Kind regards

Jiaqi Sun

Telephone: 021 680 3563
Mobile: 0722748828
Email: 14933772@sun.ac.za

How to complete the questionnaire:

The questionnaire is composed of 11 sections. Section 1 requires details about the bank and respondent. Section 2 - 11 requires information about risk management policies, enterprise-wide risk management framework, the IRR management process, risk management policy statement, risk identification, risk measurement, risk-coping issues, risk monitoring and reporting, capital management and risk aggregation issues and any subprime risk related issues.

All questions should be completed as indicated in the examples below. Some questions are answered by ticking of a box, some require a value on a scale, and others require brief comments.

Please type an **X** in the box opposite each option or type your answer where you feel "Other" is relevant.

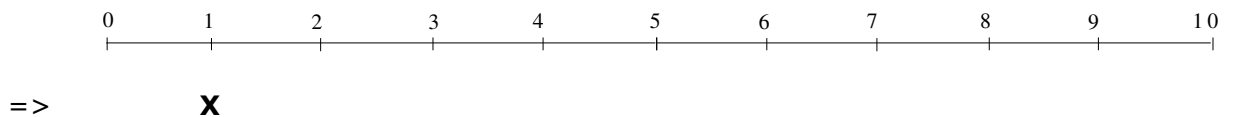
1	Yes	X
2	No	
3	Other (please specify)	

Some questions require you to indicate some value on a scale. The scale values have the following meaning:

0	You do not agree at all with the issue that is raised by the question.
5	You would agree with the issue that is raised by the question about 50% of the time.
10	You completely agree with the issue that is raised by the question.

Please move the **X** with the spacebar below to the appropriate value under the scale value that you want to indicate. The example question is illustrated as follows.

To what extent do you think that banks are generally correct about the risks that they are exposed to?



Section 1. Details of the Bank/Respondent

1.1 Please indicate (with an **X**) an appropriate value range (Rand) of the balance sheet size of the bank as at 2009 financial year end.

1	Below R100 billion	
2	R100-300 billion	
3	R301-500 billion	
4	R501-700 billion	
5	Above R700 billion	
6	Other (please specify) _____	

1.2 Please indicate (with an **X**) an appropriate value range (Rand) of the total loans/advances portfolio.

1	Below R100 billion	
2	R100-300 billion	
3	R301-500 billion	
4	R501-700 billion	
5	Above R700 billion	
6	Other (please specify) _____	

1.3 Please indicate (with an **X**) an appropriate value range (Rand) of the total deposit portfolio.

1	Below R100 billion	
2	R100-300 billion	
3	R301-500 billion	
4	R501-700 billion	
5	Above R700 billion	

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6	Other (please specify) _____
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1.4 Please indicate (with an **X**) whether the bank is an international or local bank.

1	Local Bank	
2	International Bank	
3	Local and International Bank	
4	Other (please specify) _____ _____	

1.5 Please indicate your current designation (job description of the person completing the questionnaire).

	_____ _____ _____
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1.6 Please indicate (with an **X**) which one or more of the following, as it relates to bank risk management, is part of your responsibility:

1	Risk Management Policy Design	
2	Risk Management Process Implementation	
3	Risk Control	
4	Risk Auditing	
5	Risk Capital Management	
6	Other (please specify) _____ _____	

1.7 Please indicate (with an **X**) what proportion of the bank's deposit-liabilities originate from South Africa.

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1	Below 10%	
2	10-30%	
3	31-50%	
4	51-70%	
5	Above 70%	
6	Other (please specify) _____	

1.8 Please indicate (with an **X**) what proportion of loans and advances to clients originate from South Africa.

1	Below 10%	
2	10-30%	
3	31-50%	
4	51-70%	
5	Above 70%	
6	Other (please specify) _____	

1.9 Please supply additional comments on issues not addressed in this section that you feel may add value to the questions asked.

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Section 2. Risk Management Policies, Procedures and Standards

2.1 Please indicate (with an **X**) on which one or more of the following policies the banking book IRR management is based.

1	Policy based on the Standard Model of Basel II	
2	Policy based on the Internal Model of the Bank	
3	Policy based on the South African Bank's Act, 94 of 1990	
4	Other (please specify)	

2.2 Please indicate briefly what risk identification, risk measurement, risk mitigation and risk monitoring tools are employed to manage your banking book IRR.

2.3 Please indicate (with an **X**) which one or more of the following procedure(s) are in place to manage the banking book IRR.

1	Procedure based on Bottom-up and Top-down Decision-making Process	
2	Procedure based on the Transversal Process	
3	Procedure based on Corporate/Risk Governance Principles	
4	Other (please specify)	

2.4 Please briefly indicate which aspect(s) of banking book IRR are of vital importance for this type of risk.

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2.5 Please indicate (with an **X**) which one or more of the following risk management standard(s)/principle(s) are pursued for banking book IRR management.

1	G-30 risk standards	
2	Basel II	
3	Principles for the Management and Supervision of Interest Rate Risk	
4	Other (please specify)	

2.6 Please supply additional comments on issues not addressed in this section that you feel may add value to the questions raised.

Section 3. Enterprise-wide Risk Management (ERM) Framework

3.1 Does the bank follow an ERM approach to manage risks?

1	Yes	
2	No	
3	If not, why not? _____ _____	

3.2 If you answered “No” in question 3.1, what approach does the bank follow?

_____ _____ _____

3.3 If you answered “Yes” in question 3.1, please indicate (with an **X**) which one or more of the following regulation(s) governs/influences the ERM framework of the bank the most.

1	Sarbanes-Oxley Act	
2	Continental European Act	
3	International Governance Standard	
4	COSO Model	
5	South African Bank’s Act	
6	South African King II Report	
7	Basel II Accord	
8	Principles for the Management and Supervision of Interest Rate Risk	
9	Other (please specify) _____ _____	

3.4 Please indicate (with an **X**) which corporate governance standard(s) the bank applies to manage the banking book IRR.

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1	International Corporate Governance Standard	
2	South African King II Regulation	
3	Other (please specify)	

3.5 Please indicate (with an **X**) to which one or more of the following framework(s) and/or standard(s) the bank's ALM banking book IRR management is aligned.

1	ERM Framework	
2	Corporate Governance Standard	
3	Other (please specify)	

3.6 Please indicate (with an **X**) to which one or more of the following framework(s) and/or standard(s) the bank's reporting line of banking book IRR management is aligned.

1	ERM Framework	
2	Corporate Governance Standard	
3	Other (please specify)	

3.7 Please supply any relevant comments about issues not covered in this section that you feel may add value.

Section 4. Overall Bank Interest Rate Risk Management

4.1 Do you think that short-term IRR should be managed separately from the management of IRR in general?

1	Yes	
2	No	
3	If not, why not? _____ _____	

4.2 If your answer to 4.1 is Yes, please indicate (with an **X**) if the bank has developed a framework/system for short-term IRR management that is separate from the overall IRR management process or system.

1	Yes, system developed	
2	No, no system	
3	If not, why not? _____ _____	

4.3 Does the bank’s risk management process align with the general strategic objectives of the bank?

1	Yes	
2	No	
3	If not, why not? _____ _____	

4.4 According to the inflation targeting policy adopted by the South African Reserve Bank (SARB) in 2000, the SARB Monetary Policy Committee (MPC) meets February, April, June, August, October and December each year to calculate the inflation index⁴ for the previous quarter and forecast inflation for the next quarter and next two years, thereafter the repo-rate is adjusted accordingly. However the problem is that the quarterly inflation index is released in March, June, September and December (specific date of each month may change).

⁴ Stats SA or SARB quarterly inflation index is used.

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This means that the repo-rate will be adjusted again in the upcoming MPC meeting after inflation index release date. This creates a period of uncertainty between the MPC meetings and the next release of inflation figures.

With this in mind, do you agree that the fixed-rate loan assets (with maturity usually longer than three months) of the bank are exposed to the uncertainty of the degree of the repo-rate adjustments, which may not be optimal between MPC meetings every two months? In other words do you agree that fixed-rate loans issued after the previous MPC meeting are likely to be exposed to interest income losses in the following MPC meeting when the repo-rate may be adjusted?

1	Yes	
2	No	
3	If not, why not? _____ _____	

4.5 As was stated in question 4.4 above, briefly indicate, according to you, what key elements are needed to manage such short-term (two months) IRR exposure of the bank.

_____ _____ _____

4.6 As stipulated in Basel II and other relevant documents issued by the Basel committee on banking supervision, new risk factors (such as inflation targeting policy-induced risk source) should be taken into account by the internal risk management model of the bank.

Do you agree that it is imperative to also develop a systematic process to manage new short-term IRR exposures?

1	Yes	
2	No	
3	If not, why not?	

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4.7 Please briefly describe the key elements needed for an adjustment to current short-term IRR management practices.

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4.8 Please supply any relevant comments about issues not covered in this section that you feel may add value to the questions raised.

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Section 5 Bank Risk Management Policy Statement

5.1 Has the bank implemented a policy statement that clearly defines banking IRR management, in particular the short-term IRR?

1	Yes	
2	No	
3	If not, why not? _____ _____	

5.2 Please indicate (with an **X**) the major banking book IRR management problems that you think the policy statement and/or risk management strategy should address.

1	Unexpected Market Events	
2	New Risk Factors	
3	Model Risks	
4	Other (please specify) _____ _____	

5.3 If your answer to 5.1 is “Yes”, please indicate (with an X) if the policy and/or strategy is implemented as described in the policy statement and/or strategic document?

1	Yes	
2	No	
3	If not, why not? _____ _____	

5.4 Please indicate (with an **X**) if there has generally been any difficulty in implementing the policies, procedures and standards in the bank.

1	Yes	
2	No	
3	If not, why not?	

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5.5 If your answer to 5.4 is "Yes", please indicate (with an **X**) what problems may hinder implementation.

1	Unclear Policy Document Leading to Lack of Understanding	
2	Interpersonal Miscommunication	
3	Reporting Line is Too Long	
4	Non-distribution of Policy Document	
5	Other (please specify)	
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5.6 Please supply any relevant comments about issues not covered in this section that you feel may add value to the questions raised.

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Section 6. Risk Identification and Prioritization

One of the most important aspects to consider, as it relates to financial risk management in any organisation, is the proper identification of risks. With this in mind, please answer the following questions:

6.1 Please rank the following risk types according to their importance within the bank. Enter 1 next to the option you deem most important and 9 next to the option you deem least important.

1	Banking Book IRR	
2	Trading Book IRR	
3	Credit Risk	
4	Liquidity Risk	
5	Operational Risk	
6	Cultural Risk	
7	Model Risk	
8	Embedded-option/Derivative Risk	
9	Other (please specify) _____	

6.2 Please indicate, in your opinion, what is the best method to identify exposure to banking book (including short-term) IRR.

1	Interest rate Sensitivity Analysis	
2	Regression Analysis	
3	Principal Component Analysis	
4	Other (please specify) _____ _____	

6.3 Please indicate (with an **X**) whether the management of the bank has adopted risk limit(s) for the banking book IRR.

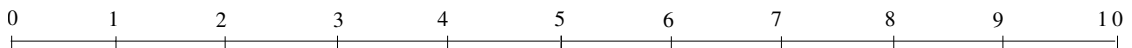
1	Yes	
2	No	
3	If not, why not?	

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6.4 If your answer to 6.3 is "Yes", please indicate how the risk limit is set.

6.5 In your opinion, how important (0 means least important and 10 means most important) is inflation as a factor contributing to short-term banking book IRR exposure/volatility.



=> **X**

6.6 Please indicate how the bank determines/forecasts the inflation for the planning period.

1	External Supplier	
2	Own Internal Econometric Model/Department	
3	Other (please specify)	

6.7 If the inflation forecast of the bank differs significantly from the SARB and/or Reuters inflation forecast(s), please indicate (with an **X**) which of the following corrective measures the bank takes to minimize such inconsistencies.

1	Adjustment of the Bank's Forecast to SARB's and/or Reuter's Forecast	
2	No Actions are Taken	
3	Other (please specify)	

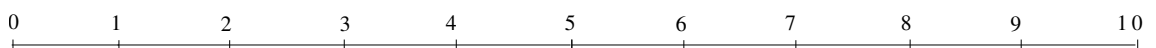
6.8 The following rates have an impact on the lending rates of loan-assets of the bank. Please rank the following rates according to their importance within the bank. Enter 1 next to the option you deem most important and 5 next to the option you deem least important.

1	Repo-rate	
2	Prime Overdraft Rate	
3	Call Rate	
4	32-day Notice Rate	
5	Other (please specify) _____	

6.9 The following rates have an impact on the borrowing rates of deposit-liabilities of the bank. Please rank the following rates according to their importance within the bank. Enter 1 next to the option you deem most important and 5 next to the option you deem least important.

1	JIBAR	
2	Repo-rate	
3	Prime Overdraft Rate	
4	Call Rate	
5	32-day Notice Rate	
6	Other (please specify) _____	

6.10 To your knowledge, when the SARB adjusts the repo-rate, to what extent do you agree (0 means you do not agree, 10 means you agree) that this adjustment is a potential risk exposure (e.g. where the net interest margin⁵ is declining) to the portfolio consisting of long-term fixed-rate loan asset and short-term floating-rate deposit liabilities?

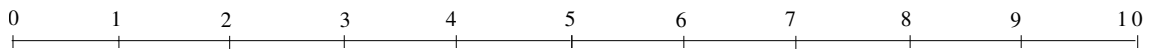


=> **X**

⁵ Net interest margin is calculated as long-term fixed-rate loan interest income minus short-term floating-rate deposit liability interest expense, and then divided by the long-term fixed-rate loan asset value.

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6.11 In an expected declining interest rate environment, to what extent do you agree (0 means you do not agree, 10 means you agree) that the embedded-option risks of assets and liabilities could cause a significant risk exposure (e.g. where interest income decreases) to the portfolio consisting of long-term fixed-rate loan assets and short-term floating-rate deposits?



=> **X**

6.12 Please supply any relevant comments about issues not covered in this section that you feel may add value to the questions raised.

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Section 7. Risk Measurement

7.1 Please indicate (with an **X**) which one or more of the following risk measurement tools you deem as the most important with which to measure short-term IRR.

1	Value at Risk (VaR)	
2	Repricing GAP Analysis	
3	Duration Analysis	
4	Duration GAP Analysis	
5	Sensitivity Analysis	
6	Earnings at Risk (EAR)	
7	Not Sure	
8	Other (please specify) _____ _____	

7.2 Do you think VaR could be used to quantify short-term interest income variance?

1	Yes	
2	No	
3	If not, why not? _____ _____	

7.3 If the banking book VaR technique is used or its use for the future is planned, please indicate (with an **X**) which one or more of the following VaR application approaches would, according to you, produce the most accurate/meaningful results.

1	Variance-Covariance Method	
2	Historical Simulation	
3	Monte Carlo Simulation	
4	Not Sure	
5	Other (please specify) _____	

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7.4 Does the bank apply stress-testing to evaluate the impact of certain market factors on income and the riskiness of the bank?

1	Yes	
2	No	
3	If not, why not? <hr/> <hr/>	

7.5 If your answer to 7.4 is Yes, please specify the key elements important for the stress-testing procedure.

<hr/>
<hr/>
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7.6 Does the bank measure embedded-option risks?

1	Yes	
2	No	
3	If not, why not? <hr/> <hr/>	

7.7 If your answer to 7.6 is Yes, please indicate (with an **X**) which one or more of the following methods are used to measure embedded-option risks.

1	Questionnaire	
2	Interview	
3	Regression Analysis	
4	Risk Survey	
5	Risk Workshop	

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6	External Risk Scanning	
7	Other (please specify)	

7.8 Please indicate (with an **X**) which one or more of the following actions (generally) are taken to minimize the shortcomings of risk measurement tools such as GAP analysis and VaR.

1	Using a Mixture of Different Measurement Techniques	
2	Using a Mixture of Quantitative and Qualitative Measures	
3	No Actions are Taken	
4	Other (please specify)	

7.9 Please specify the key elements that you deem important to minimize the shortcomings of IRR measurement tools.

_____ _____ _____

7.10 Please supply any relevant comments about issues not covered in this section that you feel may add value to the questions raised.

_____ _____ _____

Section 8. Managing Financial Risks

8.1 Rank the following instruments according to their use for management of IRR. Enter 1 next to the instrument used most and 6 for the instrument used least.

1	Forward Rate Agreement	
2	Interest Rate Swap	
3	Interest Rate Futures	
4	Caps	
5	Floors	
6	Other (please specify) _____	

8.2 Please indicate (with an **X**) whether the bank has taken any measures to reduce the risks created by derivative instruments.

1	Yes (please specify) _____ _____	
2	No	
3	If not, why not? _____ _____	

8.3 Please supply any relevant comments about issues not covered in this section that you feel may add value to the questions raised.

_____ _____ _____

Section 9. Risk Monitoring and Reporting

9.1 Please indicate whether the ALM/Treasury unit does any back-testing to monitor the risk inherent in the modelling technique (such as GAP Analysis and VaR) used to model financial risks.

1	Yes	
2	No	
3	If not, why not? _____ _____	

9.2 If your answer to 9.1 is Yes, please briefly describe how this back-testing is carried out.

9.3 Please indicate (with an **X**) to which unit the ALM unit reports.

1	Bank Risk Management Committee	
2	Board of Directors	
3	Senior Management	
4	Other (please specify) _____ _____	

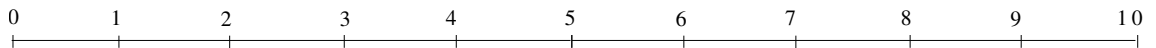
9.4 Please supply any relevant comments about issues not covered in this section that you feel may add value to the questions raised.

Section 10. Capital Management and Risk Aggregation

10.1 Does the bank maintain/plan to maintain capital in excess of the regulatory requirements?

1	Yes	
2	No	
3	If not, why not? <hr/> <hr/>	

10.2 To what extent, do you agree (0 means you do not agree, 10 means you agree), that short-term IRR impacts negatively on the capital position of the bank?



=> **X**

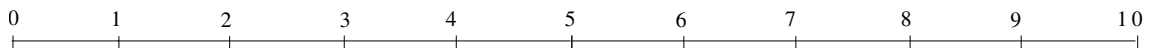
10.3 Please supply any relevant comments about issues not covered in this section that you feel may add value to the questions raised.

Section 11. The USA Subprime Crisis and Impact on Bank Management in South Africa

Please consider the turmoil created in the financial markets that originated from the real estate subprime loans in the USA. Numerous problems (such as the liquidity crisis) were created by the crisis that affects banks.

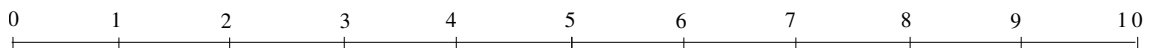
11.1 Thinking back about these events that have played out in the market and are still playing out, what would you do differently now as it relates to bank risk management?

11.2 How important (0 means least important and 10 means most important) do you think that the subprime crisis was for changes in bank risk management in future?



=> **X**

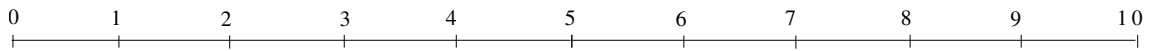
11.3 With the subprime crisis in mind, how well (0 means not well and 10 means excellent) do you think the South African banks are positioned to handle such a market environment?



=> **X**

11.4 To what extent, generally, do you agree (0 means you do not agree, 10 means you agree) that local and foreign banks were guilty of herding (following each other as it relates to behavioural finance)?

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=> **X**

11.5 In your opinion, which risk(s) have been affected the most by the recent market turmoil?

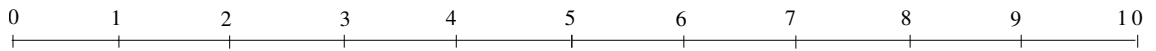
1	IRR	
2	Liquidity Risk	
3	Credit Risk	
4	Market Risk	
5	Capital Risk	
6	Other (please specify)	

11.6 In your opinion, what factors contributed to South Africa being sheltered from the crisis?

11.7 Based on the lesson learnt from the global financial crisis and economic slow-down, please indicate what measures had been taken in your organisation to prevent future financial losses.

11.8 To what extent, do you agree (0 means you do not agree, 10 means you agree) that banks are generally correct about the magnitude of risks to which they are exposed?

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=> **X**

11.9 Please indicate (with an **X**) whether the crisis has highlighted the flaw(s) of the risk management process as it is today?

1	Yes	
2	No	
3	If not, why not? <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/> <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/>	

11.10 Please indicate (with an **X**) whether the crisis has highlighted the flaw(s) of the risk monitoring stage of the risk management process as it is today.

1	Yes	
2	No	
3	If not, why not? <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/> <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/>	

11.11 Please indicate (with an **X**) whether the crisis has highlighted the flaw(s) of the risk reporting stage of the risk management process as it is today.

1	Yes	
2	No	
3	If not, why not? <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/> <hr style="border: 0; border-top: 1px solid black; margin: 5px 0;"/>	

11.12 Please supply any relevant comments about issues not covered in this section that you feel may add value to the questions raised.

