

LIQUIDITY MEASUREMENT AND MANAGEMENT IN THE SEACEN COUNTRIES

Tientip Subhanij
(Project Leader)



The South East Asian Central Banks (SEACEN)
Research and Training Centre
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The South East Asian Central Banks (SEACEN)
Research and Training Centre
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in the SEACEN Economies**
By Tientip Subhanij (Project Leader)

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Foreword

In light of the recent global financial turmoil, the crisis in liquidity has received much attention because of its potential effect on various markets. Financial innovation and market developments have also changed the nature of liquidity crisis in recent years as the funding of some banks has shifted towards a greater dependence on the capital markets. A bank may be solvent, but if lenders lose confidence in the bank's ability to provide funds upon request, this can result in a liquidity crisis which can bring down an otherwise healthy institution in a short period of time. Once started, a liquidity crisis can be very hard to stop, as adverse dynamics may feed back on themselves. Compared to other financial risks, therefore, liquidity risk may be the most challenging, both in terms of measurement and management.

Recent events have clearly demonstrated that strengthened liquidity management practices are desirable to prepare banks for a period of severe liquidity stress. From the perspective of financial institutions, sound liquidity management is crucial for reducing funding and market liquidity stresses. It also enables them to meet cash flow obligations without affecting daily operations or financial conditions once the banking system comes under severe pressure. From the stance of central bankers, the recent episodes of liquidity support have prompted central banks to review an increasingly important liquidity management policy on how to strike a balance between preserving financial stability and avoiding moral hazard amid financial turmoil.

This research highlights the importance of understanding and building good defences against liquidity stress, particularly as the macroeconomic and financial market developments of the past few years have led to an increase in many banks' overall exposure to liquidity risk. This study explores various practices in liquidity measurement and management in SEACEN countries as well as the linkages and factors that affect different types of liquidity in the banking sector in the region. The study reveals that measuring and managing liquidity are non-trivial issues and proposes that differences in national liquidity regimes should be taken into account when designing liquidity management strategy for regulatory purposes. We hope that the findings and suggestions of this study will be valuable references to central bankers and other policy makers in their design of future liquidity supervision.

This collaborative research was led by Dr. Tientip Subhanij, Chief Researcher, Economic Research Department of the Bank of Thailand and concurrently Visiting Research Economist of The SEACEN Centre, and participated by 8 country researchers from 8 member central banks. The SEACEN Centre wishes to express its sincere gratitude to the participating member central banks and their country researchers for actively participating in this project and preparing the country chapters for their respective countries. They are namely, Mr. Ouk Sarat from National Bank of Cambodia; Mr. Myeong-suk Kim from The Bank of Korea; Mr. Syarurizal Mohd Sabri from Bank Negara Malaysia; Ms. May Toe Win from Central Bank of Myanmar; Mr. Neil Angelo C. Halcon from Bangko Sentral ng Pilipinas; Mr. P.D.R. Dayananda from Central Bank Sri Lanka; Mr. Lin Ming-Kuan from Central Bank of the Republic of China (Taiwan); and Ms. Sirinit Rattanapintha from Bank of Thailand. The Centre also thanks Dr. Charles Adams, Visiting Professor of the Lee Kuan Yew School of Public Policy of the National University of Singapore, for his useful comments and suggestions in his review of the integrative report. The assistance of staff members of the Research and Learning Contents Department of The SEACEN Centre is gratefully acknowledged as well.

The views expressed in this study, however, are those of the authors and do not necessarily reflect those of The SEACEN Centre or the SEACEN member central banks.

August 2010

Dr. A.G.Karunasena
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Executive Summary

Many past financial episodes have highlighted the importance of liquidity for the well-functioning of the financial system. The recent global financial crisis which was unprecedented in scale and scope is no different. A well known reason for the severity of such crisis lies in the propagation of original shock that is compounded by extreme bank funding fragility, forcing fire sales across all markets. The funding of some banks has shifted towards a greater dependence on the capital markets. These wholesale funding sources such as commercial papers, repurchase agreements, and other commercial money market instruments, as the recent financial crisis illustrates, tend to be more volatile than traditional retail deposits and may pose additional challenges to liquidity risk management which is important for the long-run viability of a bank.

In the US, the loss of investor confidence in a wide range of structured securities markets led to risks flowing onto banks' balance sheets. The initial shock in credit markets was transmitted through a fall in asset market liquidity, which led to an increase in funding risk. Money markets tightened internationally as banks built up liquidity to meet contingent claims. Banks in SEACEN countries, on the contrary, remain resilient to the global financial crisis as a result of ample liquidity and traditional banking businesses pursued prior to the crisis. Banks in this region are mostly dependent on deposit and loan businesses, and hence have a range of defenses against a sudden decline in the availability of wholesale funds. In this context, the first lesson learned is that a market-based financial system relies more, and not less, on funding liquidity.

In terms of counter-measures to liquidity pressures, banks usually have several strategies, i.e. transforming illiquid assets into cash, bidding for higher retail deposits and slowing or even reducing their lending to households and corporate customers. These defenses, however, suffer from a common shortcoming. While they may work well when one bank is facing funding pressure on its own, every bank will attempt to use them at the same time when liquidity pressures are widespread. Therefore, there is one last line of defense left, which is what banks in SEACEN countries have executed, i.e., to hold a buffer of reliable high-quality liquid assets, such as Treasury bills or other government securities, which can be drawn on immediately and directly in the event of a sudden withdrawal of market liquidity or an unexpected increase in funding requirement. Based on this experience, the second lesson, therefore, is that consideration should clearly be given to maintaining the holdings of very high-quality liquid

assets that can provide reliable reserves under all conditions. It should be noted, however, that although liquidity buffers are generally beneficial, it can also act as a constraint on banks' profitability and efficient risk management.

Another lesson drawn from the recent episode is the disclosure practices in relation to liquidity risk management objectives. Strict and relatively comprehensive liquidity report submissions required by central banks in the region has enabled them to be proactive on liquidity risk management. These practices have also made it easier for central banks in the region to distinguish between solvent and illiquid banks and therefore impose liquidity cushions to the ones most in need.

In terms of the liquidity environment, the SEACEN country experiences have highlighted the important role played by deposit insurance in containing runs on banks. Although deposit insurance schemes, narrowly defined as those designed to protect retail depositors, can perform a variety of roles, the one they are considered most relevant for is that of preventing runs on banks. An important lesson learned is that there should be improvement on funding markets and public confidence by broadening the scope of bank guarantees to ensure future financial stability.

For central banks, the opening of the lending window more broadly, and ensuring the smooth functioning of the short-term money market as well as government bond market are also important in effective liquidity management. Although the existence of central bank lending facilities can be viewed as a double-edged sword as it could cause "moral hazard" problems, experiences in this region indicate that banks usually use central bank liquidity only as the last resort to avoid negative interpretation regarding their financial health. It is also crucial for central banks to acknowledge systemic risk due to liquidity spirals and consider the system as a whole, as opposed to each institution in isolation.

Going forward, there is little doubt that regulators will pay far more attention to liquidity management than they have in the past. In this environment, diversity in the national liquidity regimes should be

considered and the heterogeneity in financial market conditions should be taken into account when designing liquidity management strategies. Factors such as deposit insurance arrangements, central bank lending policies and banks' own balance sheet choices are also crucial in determining banks' vulnerability to liquidity risk. Therefore, to build strong defenses against future liquidity crisis, there requires a good understanding of a country's specific regulatory policies, the nature of banks' assets and liabilities as well as the economic and liquidity environment in which they operate.

TABLE OF CONTENTS

FOREWORD	iii
EXECUTIVE SUMMARY	v
CONTENTS	ix

PART I: INTEGRATIVE REPORT

LIQUIDITY MEASUREMENT AND MANAGEMENT IN THE SEACEN ECONOMIES

by Tientip Subhanij

1. Introduction	1
2. Objectives of the Study	2
3. Conceptual Framework	3
3.1 The Notion of Liquidity	3
3.2 Liquidity Linkages	4
3.3 Liquidity Sources	7
4. Liquidity Dynamics and Management	10
4.1 Liquidity Profile and Indicators Across Countries.....	10
4.2 Bank's Liquidity Management	15
4.3 Factors Affecting Liquidity Risk	19
5. The Role of Central Bank and Liquidity Risk Management	22
5.1 Why Should Central Banks Be Concerned About Market Liquidity?	22
5.2 Liquidity Supervisory Practices	25
6. Conclusion and Policy Recommendation	32
References	36
Appendix	38

PART II: COUNTRY CHAPTERS

CHAPTER 2: LIQUIDITY MANAGEMENT AND MEASUREMENT IN CAMBODIA

By Ouk Sarat

1. Overview of Financial System and Commercial Bank Industry in Cambodia	49
1.1 Structure of the Financial System in Cambodia	49

1.2	Characteristics of Banking Sector	50
1.3	Characteristics of Non-Bank Business	53
2.	The Role of Central bank	54
2.1	Role and Function of the National Bank of Cambodia	54
2.2	Central Bank's Recommendation Regarding Liquidity Management	55
2.3	Collateral Criteria for Borrowing from the Central Bank	57
3.	Dynamics and Determinants of Liquidity in Cambodia	58
3.1	Liquidity Profile in the Financial System	58
3.2	Development of Liquidity Indicators	61
3.3	Factors Affecting Liquidity Risk in Cambodia	69
4.	Liquidity Risk Management in Banks	71
4.1	Past Development	71
4.2	Current Practices	72
5.	Lessons Learned	75
5.1	Trend in Liquidity Risk Management	75
5.2	Role of Liquidity Risk in Triggering Financial Crisis	76
5.3	Development of Liquidity Situation	77
5.4	Future Prospect	77
6.	Conclusion	78
	References	80

CHAPTER 3: LIQUIDITY MEASUREMENT AND MANAGEMENT IN KOREA

By Myeong-suk Kim

1.	Introduction	81
2.	Overview of Financial System and Commercial Banking Industry in Korea	81
2.1	Share of Banking Sector vs. Capital Market (Bond and Equity Markets)	82
2.2	Characteristics of Banking Sector	84
2.3	Nature of Bank and Non-bank Businesses	84
2.4	Characteristics of Government Bond Market	86
2.5	Regulations and Restrictions Regarding Banks' Business	88
3.	Role of the Bank of Korea	90
3.1	As a Liquidity Provider	90
3.2	As a Financial Regulator	92

3.3 Collateral Criteria for Borrowing from the Central Bank	93
4. Development and Determinants of Liquidity Risk	95
4.1 Liquidity Profile in Korean Financial System	95
4.2 Development of Liquidity Indicators	95
4.3 Measuring a Korean Market Liquidity Indicator	100
4.4 Factors Affecting Liquidity Risk in Korea	104
5. Management of Liquidity Risk by Commercial Banks	104
5.1 Regulations on Liquidity Risk Management	105
6. Lessons Learned in Korea	107
6.1 Trends in Liquidity Risk Management Practices before and after Recent Global Financial Crisis	107
6.2 Role of Liquidity Risk in Triggering Past Financial Crises, including a Fast Case Study	109
6.3 Development of Liquidity Situation (in Banking Sector) before and after Recent Global Financial Crisis	110
6.4 Future Prospects	110
7. Conclusion and Policy Recommendations	111
7.1 Conclusion	111
7.2 Policy Recommendation	111

CHAPTER 4: MALAYSIA LIQUIDITY RISK: SAILING THROUGH THE TURBULENT YEARS

By Syarurizal Mohd Sabri

1. Overview of Financial System and Commercial Bank Industry in Malaysia	113
1.1 Share of Banking Sector vs. Capital Market (Bond and Equity Market)	113
1.2 Characteristics of Malaysian Financial Institutions	115
1.3 Nature of Banks' Business	117
1.4 Characteristics of Government Bond Market	119
1.5 Regulations and Restrictions Regarding Banks' Business Activities	121
2. The Role of Central Bank	122
2.1 As Liquidity Provider	122
2.2 As Financial Regulator	123
2.3 Central Bank's Requirement and/or Recommendations Regarding Banks' Liquidity Measurement and Management	125

2.4 Collateral Criteria for Borrowing from Central Bank	127
3. Dynamics and Determinants of Liquidity in Malaysian Financial System	128
3.1 Liquidity Profile in the Financial System	128
3.2 Development of Liquidity Indicators (Compared with Trend)	130
3.3 Factors Affecting Liquidity Risk in Malaysia	137
4. Current Practices in Liquidity Risk Management in Banking	137
5. Lessons Learned in Malaysia	140
5.1 Trends in Liquidity Risk Management Practices Before and After the Recent Global Financial Crisis	140
5.2 Role of Liquidity Risk in Triggering Past Financial Crisis, including Case Studies	141
5.3 Development of Liquidity Situation (in Banking Sector) Before and After the Recent Financial Crisis	141
5.4 Future Prospects	142
6. Conclusion and Policy Recommendations	143
References	145

CHAPTER 5: LIQUIDITY MEASUREMENT AND MANAGEMENT IN MYANMAR

By May Toe Win

1. Introduction	147
1.1 Overview of Financial System and Commercial Banking Industry in Myanmar	147
1.2 Share of Banking Sector vs. Capital Market	148
1.3 Characteristics of Banking Sector	148
1.4 Nature of Bank's Business	149
1.5 Characteristics of Government Bond Markets	151
1.6 Regulations and Restrictions Regarding Bank's Business Activities	153
2. The Role of the Central Bank of Myanmar	153
2.1 Acting as Liquidity Provider and Financial Regulator	153
2.2 Liquidity Provision Facility by CBM	155
2.3 Central Bank's Requirement and/or Recommendations Regarding Bank's Liquidity Measurement and Management	157
3. Dynamics and Determinants of Liquidity in Myanmar	159
3.1 Development of Liquidity Indicators	159

4.	Liquidity Risk Management in Banking	165
4.1	Past Development	165
4.2	Current Practices	166
5.	Lessons learned in Myanmar	167
5.1	Trends in Liquidity Risk Management Practices Before and After the Recent Global Financial Crisis	167
5.2	Role of Liquidity Risk in Triggering Past Financial Crises	167
5.3	Development of Liquidity Situation (in Banking Sector) Before and After Recent Global Financial Crisis	168
5.4	Future Prospects	168
6.	Conclusion	169
	References	171

CHAPTER 6: LIQUIDITY MEASUREMENT AND MANAGEMENT IN THE PHILIPPINES

By Neil Angelo C. Halcon

1.	Introduction	173
2.	Overview of Financial System and Commercial Banking Industry	173
2.1	Banking Sector versus Capital Markets	175
2.2	Profile of the Banking Sector	175
2.3	Profile of the Government Bond Market	176
3.	The Role of the Bangko Sentral ng Pilipinas	178
3.1	Liquidity Provider and Financial Regulator	178
3.2	BSP Regulations Pertaining to Liquidity Management	179
3.3	Key Regulations on Business Activities by the Banks	182
4.	Dynamics and Determinants of Liquidity	184
4.1	The Financial System's Liquidity Profile	184
4.2	Development of Liquidity Indicators	186
4.3	Factors Affecting Liquidity Risk	189
5.	Liquidity Risk Management in Banking	189
5.1	Past Developments	189
5.2	Current Practices	191
6.	Issues and Lessons Learned	193
6.1	Liquidity Management before the Global Financial Crisis	193
6.2	Liquidity Situation after the Global Financial Crisis	195

7. Conclusions and Policy Recommendations	195
7.1 Concluding Remarks	195
7.2 Outlook and Policy Directions	196
Appendix	199

CHAPTER 7: LIQUIDITY MEASUREMENT AND MANAGEMENT IN SRI LANKA

By P. D. R. Dayananda

1. Overview of Financial System and Commercial Banking Industry in Sri Lanka	201
1.1 Introduction	201
1.2 Commercial Banking Operation in Sri Lanka Nature of Commercial Banking Business in Sri Lanka	202
1.3 Characteristics of Government Bond Market in Sri Lanka	204
1.4 Regulations and Restrictions Regarding Banks' Business Activities	205
1.5 Regulations and Restrictions Regarding Banks' Business Activities	206
2. Role of the Central Bank of Sri Lanka	207
2.1 The Central Bank of Sri Lanka	207
2.2 Supervision and Regulation of Financial System in Sri Lanka	207
2.3 Regulatory Requirements on Commercial Bank Liquidity, Risk Measurement and Management	208
2.4 The Role of CBSL as a Liquidity Provider	209
3. Dynamics and Determinants of Market Liquidity in Sri Lanka	211
3.1 Market Liquidity Measurement in Sri Lanka	211
3.2 Market Liquidity Management in Sri Lanka	212
3.3 Market Liquidity Profile in Sri Lanka (2005 – 2009)	214
3.4 Funding Liquidity in Commercial Banks of Sri Lanka	221
3.5 Market Liquidity vs. Funding Liquidity at Call Money Market	223
3.6 Factors Affecting Liquidity Risk in Sri Lanka	223
4. Liquidity Risk Management in Commercial Banks in Sri Lanka	225

4.1	Past Development	225
4.2	Current Practices	226
4.3	Contingency Funding Plans and Stress Test	228
5.	Lessons Learned from Recent Financial Crisis	228
5.1	Liquidity Risk Management Practices after Crisis	228
5.2	Bank Crisis in Sri Lanka - Case Study	229
6.	Conclusion and Policy Recommendation	230
	References	233

CHAPTER 8: LIQUIDITY MEASUREMENT AND PRACTICES IN TAIWAN

By Michael M.K. Lin

1.	Overview of Financial System and Commercial Bank Industry	235
1.1	Share of Banking Sector vs. Capital Market	235
1.2	Characteristics of Banking Sector	236
1.3	Nature of Banks' Business	237
1.4	Characteristics of Government Bond Market	239
1.5	Regulations and Restrictions Regarding Bank' Business Activities	240
2.	The Role of Central Bank	240
2.1	As Liquidity Providers	240
2.2	As Financial Regulators	240
2.3	Liquidity Providers	241
2.4	Central Bank's Requirement Regarding Banks' Liquidity Measurement and Management	241
3.	Dynamics and Determinants of Liquidity Risk	246
3.1	Liquidity Profile in Taiwan's Financial System	246
3.2	Development of Liquidity Risk Indicators	247
4.	Liquidity Risk Management in Banking	257
4.1	Past Developments	257
4.2	Current Practices: An Application of Historical Experience	257
5.	Lessons Learned in Taiwan	264
6.	Conclusions and Future Direction	265
6.1	Conclusions	265
6.2	Future Direction	266

CHAPTER 9: LIQUIDITY MEASUREMENT AND MANAGEMENT IN THAILAND

By Sirinit Rattanapintha

1.	Overview of Thai Financial System	267
1.1	Deposit-taking Financial Institutions	268
1.2	Non-deposit-taking Financial Institutions	269
1.3	Stock and Bond Markets	269
1.4	Specialised Institutions for Financial Sector Resolution	269
2.	Banking Sector in Thailand	270
2.1	Credit Quality	271
2.2	Profitability	272
2.3	Major Uses and Sources of Funds of Thai Banking Sector	272
2.4	Liquidity Condition in Thai Bank Market	273
3.	Role of Central Bank in Banks' Liquidity Management	276
3.1	Role and Responsibility of Bank of Thailand	276
3.2	Monetary Policy and Instruments	277
3.3	Role as Financial Regulator	284
4.	Liquidity Risk Management of Banks in Thailand	286
4.1	Key Drivers Affecting Liquidity	286
4.2	Liquidity Risk Management of Banks in Thailand	288
4.3	Quantitative Tools for Liquidity Risk Measurement	291
5.	Crisis Management and Bank Resolution	291
5.1	Lessons Learned	292
6.	Conclusion and Policy Recommendations	294

PART 1

INTEGRATIVE REPORT

LIQUIDITY MEASUREMENT AND MANAGEMENT IN THE SEACEN ECONOMIES

by Tientip Subhanij¹

1. Introduction

Many past financial crises have highlighted the importance of liquidity for the well-functioning of the financial system. The recent global financial crisis which was unprecedented in scale and scope is no different. A well known reason for the severity of such crises lies in the propagation of the original shock that was compounded by extreme bank funding fragility, forcing fire sales across all markets (Brunnermeier, 2009). At the centre of this is the role played by banks which normally match savers who generally want to be able to withdraw their money at short notice with borrowers who often want to repay their loans over a longer period of time. This ‘maturity transformation’ function of banks which is necessary to allow money to be invested in a productive way by offering such maturity transformation, are inherently vulnerable to liquidity risk — the risk that a bank is unable to meet its commitments should depositors attempt to withdraw their funds ahead of the bank’s ability to repay them.²

Financial innovation and market developments have changed the nature of liquidity risk in recent years. The funding of some banks has shifted towards a greater dependence on the capital markets. These wholesale funding sources such as commercial papers, repurchase agreements, and other commercial money market instruments, as the recent financial crisis illustrates, tend to be more volatile than traditional retail

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1. Chief Researcher, Economic Research Department, Bank of Thailand and concurrently Visiting Research Economist, The SEACEN Centre (OY2009/10). The author would like to thank Charles Adams, Reza Siregar and participants at workshops hosted by The SEACEN Centre for helpful comments. The views expressed in this paper are those of the author and do not necessarily reflect the views of The SEACEN Centre or Bank of Thailand. E-mail address: TientipS@bot.or.th
 2. BCBS (2008b) distinguishes liquidity risk into two types: Funding liquidity risk and market liquidity risk. Funding liquidity risk is the risk that firm will not be able to meet efficiently both expected and unexpected current and future cash flow and collateral needs without affecting either daily operations or the financial condition of the firm. Market liquidity is the risk that a firm cannot easily offset or eliminate a position at the market price because of inadequate market depth or market disruption.

deposits and may pose additional challenges to liquidity risk management, which is important for the long-run viability of a bank. Compared to other financial risks, liquidity risk may be the most challenging, both in terms of measurement and management.

As many bankers have found to their detriment, a bank may be well capitalised and profitable, but if lenders lose confidence in the bank's ability to provide funds upon request, this may result in a liquidity crisis which can bring down an otherwise solvent institution in a short period of time. Once started, a liquidity crisis can be very hard to stop, as adverse dynamics may feed back on themselves. Liquidity risk can also be triggered through the realisation of other risks, such as the disclosure of large and unexpected trading losses, or the discovery of fraudulent activity within the bank.

These issues illustrate why it is of paramount importance to form good defences against liquidity risk, particularly as the macroeconomic and financial market developments of the past few years have led to a rise in many banks' overall exposure to liquidity risk. Although this changing financial environment has led to marked improvements in banks' efficiency and management of other risks, liquidity risk management and supervision have not always kept pace. Recent events have clearly demonstrated that future strong defences are desirable to prepare banks for periods of severe liquidity stress.

2. Objectives of the Study

The objectives of this research are to create an understanding of practices in liquidity measurement and management in SEACEN countries as well as the linkages and factors that affect different types of liquidity in the banking sector in the region. The study aims to measure various kinds of liquidity, review management of liquidity risks including supervision practices and assess the central bank's role in providing liquidity support. Lastly, the study provides lessons from liquidity management practices in the SEACEN countries and discusses policy recommendations to enhance sound practices to strengthen banks' liquidity management and improve future supervisory processes.

3. Conceptual Framework

3.1 The Notion of Liquidity

It is important to distinguish solvency from liquidity. Solvency refers to a bank having more assets than liabilities so that the equity value is positive. Liquidity refers to the ability to fund increases in assets and meet obligations as they come due. Central to this definition is an assumption that obligations will be met “at reasonable cost”. This involves meeting uncertain cash flow obligations, which depend on development of external factors and behaviour of other market participants. As discussed earlier, the fundamental role of banks in facilitating the maturity transformation of short-term deposits into long-term loans, makes banks inherently vulnerable to liquidity risk.

It is important to note that “liquidity” is different from “capital”. Any understanding of liquidity risk should begin with an understanding of its key characteristics. Liquidity risk is different from other risks in many ways. First, liquidity risk is secondary risk in the sense that the rise in liquidity risk usually follows the increase in other financial risks. It is often called a “consequential risk.” Second, the coverage of liquidity risk is different from the coverage of other financial risks and so capital is only of limited usage here. Cash inflows need to be generated instead. This can be achieved, among other ways, by selling liquid, high-quality assets. The ability to sell assets, however, depends on bank’s balance sheet position, bank’s role in the market and the ability of the market to absorb additional assets sold by banks.

This paper distinguishes three broad types of liquidity: central bank liquidity, funding liquidity and market liquidity. The first relates to the liquidity provided by the central bank, the second to the ability of banks to fund their positions, and the third to the ability of trading in the markets (Nikolaou, 2009).

Central bank liquidity refers to the ability of the central bank to supply the liquidity to the financial system when needed. This is the flow of monetary base provided to the system by central banks via central bank operations either for routine or emergency liquidity facilities.

Funding liquidity refers to the ability of banks to meet their liabilities, unwind or settle their positions as they come due (BCBS,

2008b). The IMF provides a definition of funding liquidity as the ability of solvent institutions to make agreed upon payments in a timely fashion. A bank is liquid as long as inflows are larger or at least equal to outflows.

Market liquidity refers to the ability to trade an asset at short notice, at low cost and with little impact on its price (Sarr and Lybek, 2002). Market liquidity, therefore, may be defined by three dimensions to capture these characteristics: depth, tightness and resiliency. These dimensions ensure that any amount of assets can be sold quickly at anytime within trading hours with minimum loss of value. For the purpose of this project, we will focus on liquidity in the government bond market, where bonds are being traded among financial institutions. The government bond market is considered to be the most liquid and provides the main sources of market liquidity for banks in most SEACEN countries.³

3.2 Liquidity Linkages

As discussed earlier, a security has good market liquidity if it is easy to trade, that is, has a low bid-ask spread, small price impact, and high resilience. A bank has good funding liquidity if it has ample funding from its own capital or from wholesale or retail deposits. There is an inverse relationship between liquidity and liquidity risk, that is the higher the liquidity risk, the higher the probability of becoming illiquid, and hence, the lower the liquidity. With these concepts in mind, the meaning of liquidity risk is straightforward.

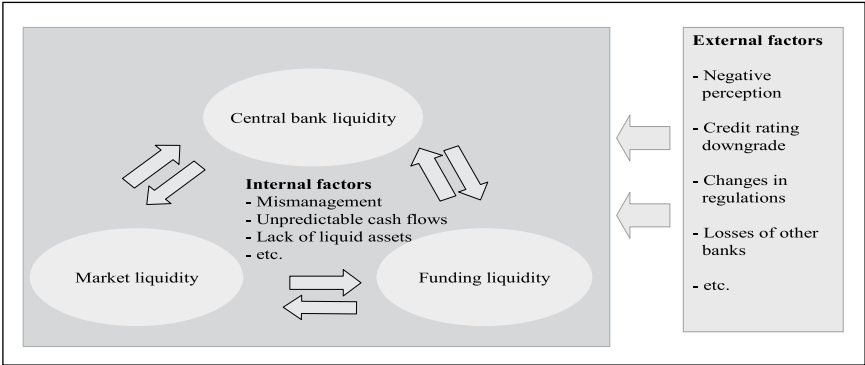
Market liquidity risk is the risk that the market liquidity worsens when a bank needs to buy or sell a security. Funding liquidity risk is the risk that a bank cannot fund its position and is forced to unwind. For example, depositors may withdraw their funds, and the bank may lose its ability to borrow from other banks or raise funds via securities issuances.

In terms of central bank liquidity risk, it is not possible to come up with a definition in the literature. This is mainly because of the common view that central bank liquidity risk does not exist. The central bank is usually able to supply base money when needed (unless constrained by

3. The other main source of market liquidity for banks includes the interbank market which is not covered in this study.

law) and, therefore, cannot be illiquid. However, a central bank can incur costs in its role as a liquidity provider (such as cost incurred from credit risk and policy risk), but these costs do not necessarily reflect liquidity risk.

Figure 1
Dynamics of Liquidity



In general, the linkages among the three various liquidity types are found to be strong. In normal times (times of low liquidity risk), such linkages produce a virtuous circle in the liquidity of the financial system, guaranteeing its smooth functioning and stability. The central bank which has the responsibility to supply liquidity, would provide the normal quantity of liquidity to the financial system via routine liquidity facilities. A bank would remain liquid as long as it can get sufficient liquidity to meet its funding requirement from the markets or the central bank.

Figure 1 illustrates the interconnectedness among various types of liquidity. Each type of liquidity is important for the well-functioning of the system and each liquidity type is dependent on the efficient functioning of the other two for the overall system to be liquid. In particular, the neutral amount of liquidity supplied by the central bank should flow among the market participants as long as market liquidity effectively recycles it and funding liquidity allocates it within the system in an efficient way. Markets should be liquid provided that there is no shortage of liquidity in the financial system on aggregate, and that each counterparty demands liquidity according to their funding needs. Last, funding liquidity in turn depends on the availability of liquidity from the market and central bank.

In periods of stress (period of high liquidity risk), the linkages among the three types of liquidity are also strong. The difference is that such strong links become propagation channels of liquidity risk in the financial system, leading to a vicious circle which may end up destabilising the financial system. The role of central bank liquidity together with supervision and regulation are of paramount importance in restoring stability to the system.

In general, banks are considered by their construction, fragile to funding liquidity risk due to the maturity transformations they undertake (e.g. liquid short-term deposits to illiquid long-term loans). Given this inherent fragility, incomplete markets and asymmetric information could prompt coordination failures among depositors demanding liquidity from the bank, resulting in bank runs, the worst form of funding liquidity risk

Funding liquidity risk in a single bank is usually not a cause of much concern for policy makers. The problem arises when funding liquidity risk is transmitted to more than one bank, that is when liquidity risk becomes systemic. Funding liquidity risk can arise directly from interbank market liquidity risk. Banks are linked by a common market for liquidity (Diamond and Rajan 2001 and 2005). Therefore, one bank failure may reduce the common pool of liquidity that links all banks together, resulting in the transmission of liquidity shortage to other banks. The remaining surplus banks may take advantage of this liquidity shortage situation and under-provide liquidity, thereby worsening the illiquidity in the interbank market. With the interbank market severely impaired, liquidity risk could be transmitted to the asset markets as banks may seek liquidity through fire-sales, thereby impacting asset prices and asset market liquidity. As asset price changes, this begins to show up in changes in net worth of the bank, leading to balance sheet adjustment on the bank's part. This process results in further asset sales and distress pricing. In this scenario, the interaction between funding and market liquidity can lead to a downward liquidity spiral in the markets. With increased popularity of securitization, the linkages between market and funding liquidity has been further reinforced, leading to faster transmission between asset markets to funding liquidity and vice versa.

To sum up, market liquidity risk is an important driver of security prices. The funding liquidity of banks is an important driver of market liquidity risk. Liquidity crisis are triggered via liquidity spirals in which losses, increasing margins, tightened risk management, and increased volatility feed on one another. When this occurs, traditional liquidity

providers become demanders of liquidity with new capital coming too slowly and prices dropping. Most SEACEN countries, however, did not experience negative interactions between funding and market liquidity during the recent global financial crisis. Despite some deposit drains during this time, banks did not have to liquidate their financial assets to fund cash outflows, partly as a result of the deposit insurance scheme.⁴

3.3 Liquidity Sources

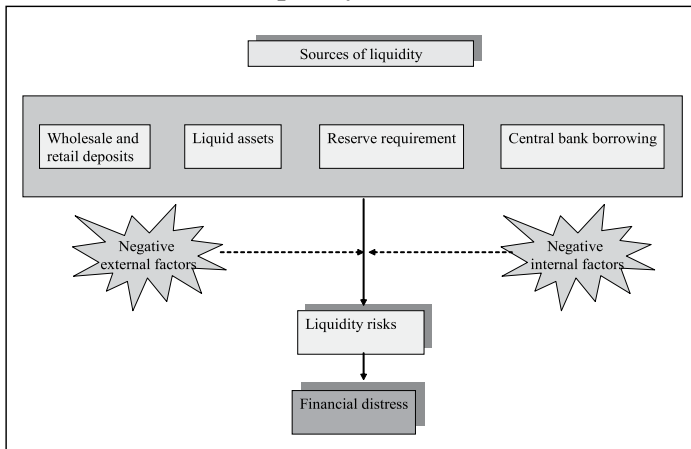
It is useful to consider the liquidity sources for banks. In general, banks have several liquidity sources such as the depositors who deposit their money at the bank, the asset market in which a bank can sell its assets, the interbank market from which a bank can obtain liquidity and the central bank from which a bank can also acquire funding liquidity during normal and crisis times. Typically, the main sources of liquidity for financial institutions, as illustrated in Figure 2, are as follows:

3.3.1 Wholesale and Retail Deposits

Wholesale deposits are a shorter and more volatile source of funding than retail deposits. When markets are unstressed, a creditworthy bank usually has no problem in borrowing money in wholesale markets. However, in stressed market conditions, there is a heightened aversion to risk. This leads to higher interest rates, shorter maturities for loans in the wholesale market, and in some cases, a refusal to provide funds at all. Deposits from retail clients are, on the other hand, a longer and less volatile source of funding than borrowings in the wholesale market. Unfortunately, liquidity problems tend to be market-wide rather than something that affects one or two banks.⁵ When one bank wants to increase its retail deposit base for liquidity reasons, others usually do the same and so the desired increase is likely to be hard to achieve.

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4. Surveyed countries in this study that already have deposit insurance are Korea, Malaysia, Philippines, Taiwan, Thailand, Indonesia and Vietnam. Others, with the exception of Cambodia, have plans to implement this by 2010 (See Table A4).
 5. Liquidity problem discussed in this paper focuses on systemic liquidity crisis, and not on liquidity problems that only affect a single institution.

Figure 2
Liquidity Sources



Fortunately, the balance sheet structure of banks in all SEACEN countries is associated with stable retail deposits as their major source of funds, accounting for around 60-80% in most countries.⁶ Deposits in the region have also experienced healthy growth. Despite deposit drains in some countries following the global financial crisis, the introduction of deposit guarantee had a stabilising effect, alleviating liquidity tension in the financial system.

3.3.2 Liquid Assets

Cash and very liquid marketable securities are relatively expensive types of liquidity insurance. The interest received on securities that can be easily converted into cash is less than the interest earned on other less liquid assets. Assessing which assets in the trading book are liquid and which are not, is a key consideration for banks. It is important to base this assessment on stressed market conditions, and not just normal market conditions. This is because when one bank is short of liquidity, other banks are likely to be in the same situation. Assets that are highly liquid in normal market conditions may become hard to sell during stressed market conditions. One result of the global financial crisis was that the trading

6. Banks in Korea, however, rely less on retail deposits than other banks in the region. The ratio is around 50% on average. This, to some extent, led to difficulties in issuing bank bonds during the global financial crisis as investors' risk aversion amplified.

books of all financial institutions suddenly became much less liquid. The inability to value and trade complex structured products caused investors to run which in turn created problems which spread to the inter-bank market (Borio, 2008 and Brunnemeier, 2009).

In SEACEN countries, banks hold large amounts of liquid assets which are well above the minimal target in their respective countries. Definition of liquid assets, however, varies among the SEACEN countries, depending on the financial market structure and development. For example, in Cambodia, liquid asset includes only cash and placements with other banks. In Malaysia, apart from securities issued by the government and Bank Negara Malaysia, other securities such as those issued by recognised government linked institutions, banker's acceptance, negotiable certificate of deposits, residential mortgage backed securities, equities, among others, are also considered as liquid assets. In Thailand, liquid asset refers to cash on hand, current account at the BOT, deposit at other commercial banks and government and BOT bonds (See Table A1). The difference in coverage of liquid asset implies that minimum holding of liquid assets can not and should not be standardized across countries.

3.3.3 Reserve Requirement

Reserve requirements require banks to keep a certain percentage of deposits as cash in the bank's vault or as deposits with the central bank. The reserve requirement usually applies only to transaction deposits (i.e., those made to a checking account). All banks in SEACEN countries have minimum holding of reserves as their primary liquidity management tools. Some countries have higher required reserve than the others. In the Philippines, for example, the required reserve is the highest in the region at 19%, reflecting in part, the authorities' concern about the health of the banking sector (Table 1). In general, despite its existence, reserve requirement is not a significant part of banks' liquidity sources. This is mainly because banks in SEACEN countries obtain most of their liquidity from retail deposits and liquid asset, and exposure to the wholesale market is, therefore, quite minimal.

3.3.4 Central Bank Borrowing

Central banks are often referred to as "lenders of last resort". When solvent banks are experiencing financial difficulties, central banks are generally prepared to supply liquidity to maintain the stability of the financial system. Collateral has to be posted by the banks and the central

bank usually applies a haircut and may charge a high interest rate. Different central banks apply different rules. In general, banks try to keep their emergency borrowings from a central bank a secret because there is a risk that the borrowings will be interpreted by the market as a sign that the bank is experiencing financial difficulties, while other sources of liquidity may also dry up. The central banks in the SEACEN countries have provided both routine and emergency facilities to banks. Central banks in the region also stand ready to help banks during crisis time. Eligible collaterals are often government or central bank bonds but there is allowance to expand the coverage of eligible securities in emergency situations. In some countries, bank loans, commercial papers and corporate bonds are included as acceptable collateral (See Table 8 and 9 for more details).

4. Liquidity Dynamics and Management

4.1 Liquidity Profile and Indicators Across Countries

SEACEN countries entered the global financial crisis in good shape. The banking system was sound with abundant liquidity. The business models of most Asian banks were originally, and continue to be, based on retail deposits and are thus safer than wholesale funded banks due to a more stable source of funds. Another unique characteristic of Asian banks is the role played by specialised financial institutions. In most countries, specialised banks help provide funds to sectors where access to commercial bank funding is limited.

Regardless of the level of financial market development, the main uses and sources of funds for banks in the region are from deposits and loans (Figure 3 and 4). Even in Korea, where reliance on wholesale funding has played a significant role, commercial banks are still the most important players in the financial system and are involved mostly in deposit-taking and lending activities. In Korea, the share of retail deposits in total source of fund has been approximately 50%⁷ and the share of lending in total uses of funds has been around 70% in recent years.

7. The retail deposits here exclude CD which in Korea is considered to be as stable as retail deposits. Korea banks usually use CD to mobilise funds from households.

Figure 3
Share of Deposit and Loan in Total Uses and Source of Funds of
Commercial Banks (Dec 2006)

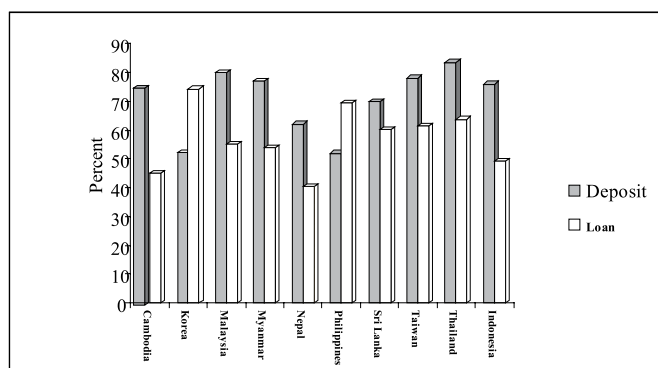
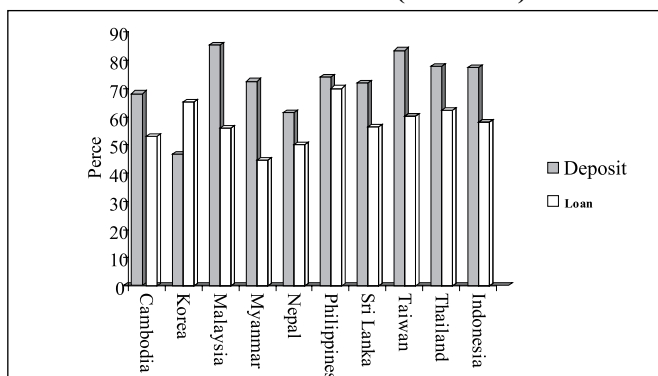


Figure 4
Share of Deposit and Loan in Total Uses and Source of Funds of
Commercial Banks (Dec 2009)



In general, liquidity appears to be abundant in most of the region. Banks have healthy deposit growth, with the ratio of loan to deposit at around 70-80 % on average. Banks in the region also hold a large amount of excess reserves and liquid assets are usually large enough to cover short-term liabilities. The ratio of excess to required reserve ratio was in the range of 20-2,000% in most countries while the ratio of liquid asset to short-term liabilities was in the range of 25-120%, well above the minimal target in all countries (Table 1).⁸

8. All tables in this paper refer to information/survey results at the end of June 2009, unless otherwise stated.

Table 1
Funding Liquidity

	Minimum reserve requirement (as % of deposits)	Excess to required reserves (%) (Jun 08)	Excess to required reserves (%)	Loan to deposit ratio (%)	Deposit growth (%)	Liquid asset to short-term liabilities (%)
Cambodia	12%	120%	220%	83%	2.44%	46%
Korea	Time deposit, Installment savings,Mutual Installments, Housing Installment, CD : 7% Other deposits : 2%	2,281.9%	2,304.8%	108.12%	3.42%	122.6%
Malaysia	Minimum reserve is a surplus between asset minus liabilities minus 8% of total deposit withdrawal shock plus liquefiable assets	298%	324%	81%	1.61%	24.78%
Myanmar	7.26%	411.90%	538.86%	58.83%	46.59%	64.07%
Nepal	5.5%	29.8%	23.0%	71%	12.6%	NA
Philippines	19%	19.8%	23.4%	69.1%	10.2%	51.8%
Sri Lanka	7%	6.29 %	-0.73%	78.5%	8.3%	34.7 %
Taiwan	7%	212.2%	304.4%	76.8%	11.5%	28.31%
Thailand	6%	272.24%	399.1%	102.80	-1.62 %	29.90 %

In Cambodia, like other countries in the region, the banking sector was flushed with liquidity. Financial intermediation was relatively low due mostly to the credit worthiness of borrowers, credit information system as well as relatively high cost of borrowings. In Malaysia, liquidity in the financial system was also ample, with banks holding a large amount of excess liquidity. Liquidity surplus was in the range of 1.55 times of deposits maturing within 1 month and around 24% of total bank deposits. The loan to deposit ratio which stood at 81% means that banks did not have to rely on interbank borrowing to fund their loans. Funding liquidity risk was at its highest during 2006-2007, when banks experienced negative mismatch mainly coming from core banking of the shortest maturity bucket. Despite this, the negative mismatch was sufficiently met by the amount of liquid assets, which was also the highest during the same period.

For Myanmar since 2005, liquidity has been moderately abundant with the loan to deposit ratio in the range of 60-70% while the banking system has healthy deposit growth. Liquid asset to short-term liabilities was relatively high, reflecting in part the high minimum requirement on reserve and liquid asset holding. In Nepal, although there has been rapid loan growth in recent years, a moderate level of excess liquidity remains in the banking system. The loan to deposit ratio was at a comfortable 71%

at the end of June 2009, compared to 60.7% in 2006. The same situation applies to the Philippines where the loan to deposit ratio stood at 69.1%, with liquid asset to short-term liabilities as high as 51.8%, reflecting adequate liquidity conditions in the financial system.

In Sri Lanka, the financial system was flooded with liquidity for most of the period, with the exception of 2008Q4-2009Q2, due to significant outflows of foreign exchange and government's difficulties in obtaining foreign funding. Overall, banks in Sri Lanka had a loan to deposit ratio around 78.5% and this is further augmented by high liquid assets to deposit ratio of more than 30%. Foreign banks in Sri Lanka appeared to be more liquid than their domestic counterparts as they had greater opportunity to find low cost funds and better investments in international markets. In Taiwan, all domestic banks have comfortably met the regulatory liquidity ratio requirement of 7%. The average liquidity ratio was as high as 28.31% and most banks held large amounts of excess reserves of around 304% of required reserve. The loan to deposit ratio was 76.8%, mainly driven by banks' conservative attitude towards lending.⁹

For other countries, such as Korea and Thailand, where the loan to deposit ratio was about 108.12% and 102.80%, respectively, the ratio is not a good measure of liquidity. This reflects the fact that a relatively larger amount of bank funding in Korea and Thailand comes from non-retail deposits. In the case of Thailand, banks also issue the bill of exchange (B/E) as an alternative source of funds. In Korea, a large part of funding comes from certificates of deposit (CD), covered bills and RPs. Although there were pressures in terms of funding and market liquidity risks after the global financial crisis in Korea, the banking system remained very liquid. The share of wholesale funding to total funding peaked at 24.9% at the end of June 2008 before declining sharply afterwards.¹⁰

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9. High excess liquidity in most SEACEN countries is also associated with weak loan demand in the region. However, banks in this region have largely learned their lessons from the 1997-1998 Asian financial crisis and, therefore, been well-prepared to withstand the recent global financial crisis with more robust regulatory environment.
 10. Some pressures in Korea during the global crisis arose from the high loan to deposit ratio which caused some concerns for foreign investors. During this time, banks had difficulties issuing bonds in the domestic and international markets. Subsequently, however, Korean banks still enjoyed abundant liquidity as their deposits increased rapidly.

Looking at incidences of banking panics across the region, there were no such problems in recent years because banks usually held enough liquid assets to cover short-term obligations while most countries also implemented the deposit insurance scheme, had better risk management system and improved asset quality. In addition, since most banks have not had much exposure to the capital market, there has been little concern about market liquidity risk. Banks still maintain their traditional role as intermediaries between short-term deposit and long-term funding. Most occasional stresses in the financial market, if they occurred at all, were usually associated with tightened liquidity in the interbank and bond markets. Meanwhile, although some banks were downgraded and confidence declined, these incidences have created neither significant funding problems nor deposit outflows.

Table 2
Liquidity Environment after Global Crisis

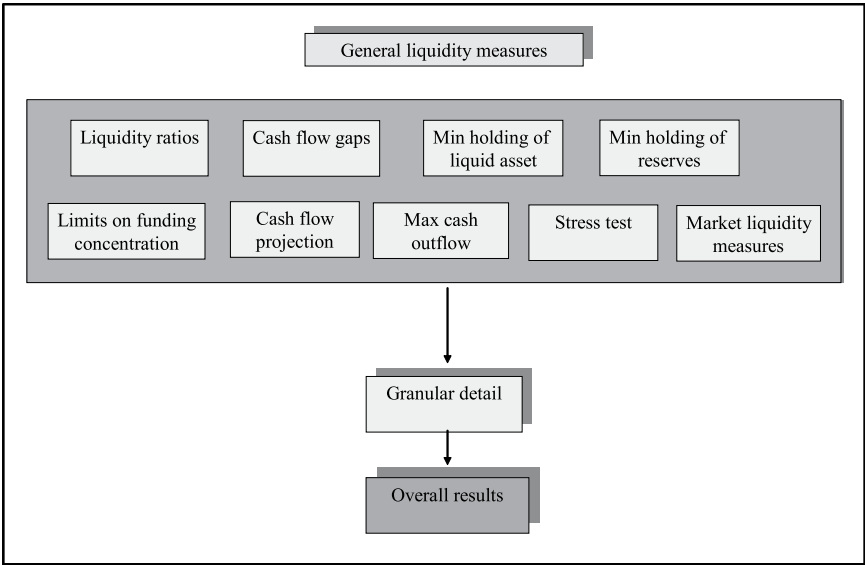
	Excess liquidity	Incidents of positions approaching or breaching internal or regulatory limits	Negative publicity	Banks' overall financial condition
Cambodia	Medium	None	None	Moderate
Korea	High	✓	None	Moderate
Malaysia	High	None	None	Strong
Myanmar	Medium	None	None	Strong
Nepal	Medium	✓	None	Moderate
Philippines	Medium	None	None	Strong
Sri Lanka	Medium	None	None	Strong
Taiwan	Medium	None	None	Strong
Thailand	Medium	None	None	Strong
Indonesia	High	None	None	Strong
Brunei	Medium	None	None	Strong

In terms of qualitative measures, there were no incidents of positions approaching or breaching limits most of the time and banks' financial conditions remained strong (Table 2). Negative publicity in SEACEN countries was not much present and external events did not appear to be a significant factor triggering liquidity risk. In Malaysia, there were panic withdrawals at some banks, but with the Malaysian government announcing a blanket guarantee in October 2008 until end 2010, the panic quickly subsided.

4.2 Bank’s Liquidity Management

Measuring and managing liquidity can be challenging, primarily because the underlying factors that drive exposures can be dynamic and unpredictable. Attempts have been made to capture the relative magnitude of liquidity. Regardless of the methods used, liquidity should be measured at a granular level, e.g. by business units, regions (Figure 5).

Figure 5
Liquidity Management



Although measurement techniques vary from bank to bank, there are some common liquidity measures, including liquidity ratios, cash flow gaps and market liquidity measures such as bid and ask spread and turnover ratio. Liquidity ratios convey a picture of a bank’s liquidity position by measuring items from the bank balance sheet, income statement, and statement of cash flows to determine the sufficiency of resources. Cash flow gaps, on the contrary, focus on known or estimated cash inflows and outflows over various time horizons to determine possible surpluses or deficits.

4.2.1 Liquidity Ratios

Dissecting a bank’s financial position is a necessary starting point in measuring liquidity risk. By understanding the composition of a bank’s

assets, liabilities, and off-balance sheet cash flows, we can develop a useful view of liquidity. In fact, the best approach is holistic - measures that provide information on assets, liabilities, and associated contingencies jointly provide a more accurate picture than a simple examination of each category on its own. For example, a bank may have a great deal of short-term liabilities coming due that might appear to be a concern, but if they are properly matched by an equally large amount of short-term assets, the concern is mitigated.

Since significant liquidity problems arise from a short-term lack of funds, metrics that reflect short-term asset and liability positions are an essential dimension of the measurement process. The state of a bank's liquidity position can be determined by examining a number of measures from the balance sheet, income statement, and statement of cash flows. While these are generally static estimates of liquidity that soon become outdated, they can still be useful because when historical information is accumulated, trends can be developed to determine whether a bank is becoming more or less liquid over time. As seen in Table 3, banks in SEACEN countries use various liquidity ratios that are tailored to their operations.

Table 3
Liquidity Ratios

	Liquidity ratio
Cambodia	1. Liquid assets divided by weighted deposits, 2. Liquid assets consist of cash, deposit with NBC, deposit with banks 3. Weighted deposit accounts as the following: a) Fixed deposits and CDs (1 month to run or less) 80% b) Fixed deposits and CDs (more than 1 month to run) 50% c) Saving deposits 50% d) Demand deposits 60% e) Marginal deposits (1 month to run or less) 80%
Korea	1. Accumulated won-currency assets/Accumulated won-currency liabilities 2. Accumulated foreign-currency assets)/(Accumulated foreign-currency liabilities 3. Accumulated foreign assets-Accumulated foreign liabilities/Total foreign assets 4. Foreign currency borrowing longer than 1 yr/Foreign currency loans longer than 1 yr
Malaysia	1. Surplus based on cashflow gap 2. Loan to Deposit ratio (LD Ratio) 3. Net Offshore borrowing / Total Domestic deposit liabilities 4. Net Domestic interbank borrowing / Total Domestic deposit liabilities 5. Total net domestic overnight interbank borrowing / Total Gross domestic interbank borrowing less overnight domestic interbank lending 6. Short term gross domestic interbank borrowing / Short term domestic total funding
Myanmar	Liquid Assets/Short-term Liabilities
Nepal	1. Excess reserve 2. Liquidity ratio 3. Large deposits 4. CD ratio 5. cash in vault to total deposits
Philippines	Liquid Assets/Deposits
Sri Lanka	Total Liquid Assets (Daily Average of statutory liquid assets) during the month / (Total liabilities excluding contingent liabilities as at the beginning of the first working day of the previous month, less liabilities to shareholders, liabilities to the Central Bank and repo liabilities)
Taiwan	Liquid reserve assets / Short-term liabilities
Thailand	1. Liquid asset/Illiquid asset 2. Liquid asset/Short-term liability 3. Excess liquidity/Minimum requirement 4. Large depositor/Total liabilities

4.2.2 Cash Flow Gaps

Asset-liability gaps are important in the effective management of liquidity risk. A bank may have stable funding and/or market liquidity sources, but it must still manage the gap between the two if it is to create a robust liquidity plan. Banks often measure cash flow mismatches because any gap that leads to a funding deficit will place demands on the bank's liquidity programme. Therefore, it is important to consider how severe such deficits can become and whether cash cushions should be accumulated in advance. Equally, any mismatch that creates a surplus can serve to reinforce the liquidity buffer in anticipation of future deficits or emergencies. Banks in SEACEN countries typically compute liquidity ratios to provide a picture of the total liquidity position and supplement this with cash flow gap by maturity/duration. In some countries, financial institutions are required by central banks to produce specific liquidity measures as evidence of their financial strength. These may be the same as those already produced internally, or they may be complementary. Like liquidity ratios, cash flow gap methods vary widely across countries, depending on what is deemed most appropriate for their banking structure (See Table 4).

Table 4
Cash Flow Gaps

	Cash flow gap method
Cambodia	The gap between financial assets and financial liabilities. No adjusted behavior. The time baskets include less than 1 month, 1-3 months, 3-6 months, 6-12 months, 1-2 years, 2-5 years, 5-10 years, and more than 10 years.
Korea	Liquidity GAP, The volume of short-term funding shortage
Malaysia	Contractual Maturity and Behavioral Maturity. Under Behavioral maturity currently is based on largest change method but soon will be replaced with mean + 2 standard deviation method
Myanmar	NA
Nepal	<ol style="list-style-type: none"> 1. Total reserve less required reserve 2. Total liquid assets to Total deposits 3. Largest 50 deposits to total deposit 4. Total credit to Total deposits 5. Cash in vault to total deposits 6. Maturity-wise assets and liabilities (All assets and liabilities are classified into upto 90 days, 91 to 180 days, 181 to 270 days, 271 to one year and above one year). However, the NRB does not compile and publish this data.
Philippines	Duration approach
Sri Lanka	Basic bucketing
Taiwan	The negative funding gap over total NTD assets within 30 days is not allowed to exceed the specific values. The specific values are -5% of total NTD assets for commercial banks, -10% of total NTD assets for industrial banks, and -15% of total NTD assets for the Export-import bank.
Thailand	Modified Duration

4.2.3 Market Liquidity Measures

It is crucial for banks that deal actively in financial instruments, including marketable securities and derivatives, to measure the amount of liquidity inherent in such contracts. Research has focused on three different dimensions of market liquidity measurement, including depth, tightness, and resiliency (Kyle, 1985). Tightness is how far transaction prices (i.e. bid or ask prices) diverge from the mid-market price - in other words - the general costs incurred irrespective of the level of market prices. Depth denotes either the volume of trades possible without affecting prevailing market prices or the amount of orders on the order books of market-makers at a given time. Finally, resiliency refers to either the speed with which price fluctuations resulting from trades are dissipated or the speed with which imbalances in order flows are adjusted. No single measure, however, unequivocally measures tightness, depth and resiliency. Some common measures to capture market liquidity include bid-ask spread and turnover ratio (Sarr and Lybek, 2002). Table 5 shows market liquidity measures, where available, in Korea, Malaysia, Philippines, Sri Lanka, Taiwan and Thailand.

Table 5
Market Liquidity

	Bid-ask spread (5-yr gov bond)	Turnover ratio (Gov bonds)	Turnover ratio (All bonds)
Korea	NA	3.97	3.45
Malaysia	NA	1.315	2.169
Philippines	10%	1.33	1.67
Sri Lanka	12.10%	8.42	NA
Taiwan	0.012%	2.8	2.6
Thailand	8.45%	0.43	1.49

Note:

1. Average yearly bid-ask spread of government bonds $S = (PA - PB) / ((PA + PB) / 2)$ where S is spread; PA is the closing ask price and PB is the closing bid price
2. Turnover ratio is the volume traded during the year/outstanding volume at year-end

All these three classes of measures can be strengthened through the use of stress testing and other quantitative limits. Table 6 summarises

liquidity management techniques used by banks in the SEACEN countries. Liquidity ratio, cash flow gaps and some minimum quantitative limits such as liquid asset and reserve holdings are commonly used tools. Stress testing is also implemented in many of the countries. Looking back, most SEACEN countries have taken the lead in implementing liquidity risk management based on the lessons of the Asian financial crisis. In Korea, after the 1997 crisis, the Financial Supervisory Service (FSS), required banks to maintain both the won and foreign liquidity ratio. In addition, banks are also required to maintain foreign currency asset and liability gap ratio above certain levels for residual maturity period no longer than 7 days and one month respectively. The long-term borrowing ratio for foreign currency loans was also established. Overall, banks in Korea, Malaysia, Thailand and Taiwan appear to have quite comprehensive liquidity management techniques.

Table 6
Banks' Liquidity Management

Tools	Countries
Min holdings of liquid assets	KR, MY,MN,NP,PH, SL,TW, TH,ID,BN,VN (11)
Min holdings of reserves	CB,KR, MY,MN,NP,PH, SL,TW, TH, ID, BN,VN (12)
Liquidity ratios	CB,KR, MY,MN, NP, PH, SL,TW, TH,ID,BN,VN (12)
Cash flow gaps	CB,KR, MY, NP, PH, SL,TW, TH,ID,BN,VN (11)
Limits on funding concentration	CB, KR, MY, SL,TW, TH, ID (7)
Cash flow projection	CB,KR, MY, SL,TW, TH, ID, BN,VN (9)
Max cash outflow	KR, MY,MN,NP,PH, SL,TW, TH, ID, BN,VN (11)
Stress testing	CB,KR, MY,PH, TW, TH, ID (7)

Note: CB=Cambodia, KR=Korea, MY=Malaysia, MN=Myanmar, NP=Nepal, PH=Philippines,
SL=Sri Lanka, TW=Taiwan, TH=Thailand, ID=Indonesia; BN=Brunei, VN=Vietnam
Number in parenthesis refer to total number of countries

4.3 Factors Affecting Liquidity Risk

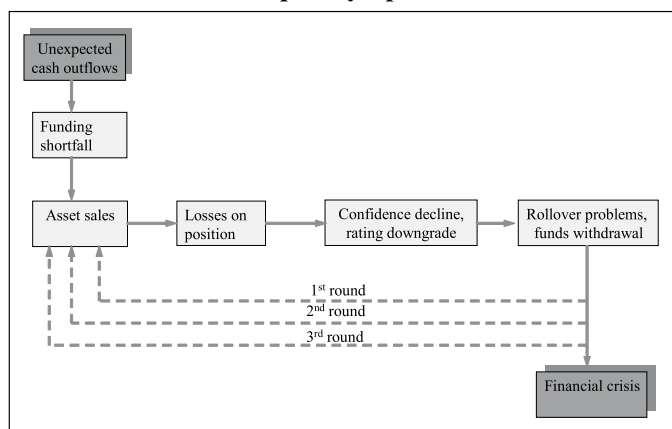
Liquidity risk can occur on both sides of the balance sheet. This can be either from inadequate liquidity generated from selling assets or insufficient liquidity available from various funding sources to meet financial obligations when needed. In most cases, the trigger of an external event, combined with an already weak bank's balance sheet, can cause an adverse liquidity outcome.

The most common sources of bank vulnerability include liquidity mismatches between assets and liabilities (assets being less liquid than liabilities), the right of depositors to withdraw funds at any time and the right of providers of short-term money market financing not to roll over funds.

Unexpected demand for liquidity is at the centre of funding liquidity risk, while anticipated obligations can normally be accommodated without much difficulty. Unexpected demand for liquidity can arise from various factors such as unpredictable cash flows, unfavourable legal or regulatory judgments, mismanagement and negative publicity or market over reactions.

Each of these factors can propagate into market liquidity risk. Unexpected demand for liquidity that exceeds the unsecured funding capacity to cover obligations requires action on the asset side of the balance sheet. If a bank must post assets as collateral at very large discounts or can only sell its asset portfolio at very low prices in order to supplement the cash position, then the sources that affect the funding risk are translated directly into market liquidity problems. For market liquidity, as immediate access to cash is also a key factor, the time dimension is as important as the cost dimension. However, assets that need to be sold quickly can create losses.

Figure 6
Liquidity Spiral



Joint market and funding problems can occur as a result of endogenous factors. A poorly planned or executed contingency funding programme can worsen the problems. If banks do not have the proper tools to control problems as they propagate, the results may be financial distress.

It should be noted that under stress scenarios, assets may not be worth the normal value especially for assets that are complex. At the same time, liabilities may not always behave as anticipated. There may be divergence between contractual and behavioural maturities and sources of funding can be unexpectedly withdrawn, recalled, or cancelled. If depositors are nervous, they may not be willing to deposit at reasonable rates, forcing banks to fund their operations at a higher cost, sell assets at a loss to carrying value, or pledge assets at unfavourable terms in which case a systemic crisis can ensue (Figure 6).

In the SEACEN countries, the most common factors affecting funding liquidity are asset-liability mismatch and contagion effect (Table 7). In terms of market liquidity, the most important drivers are the lack of liquidity in the interbank and bond markets, the global financial crisis as well as the loss of confidence. In some countries such as Malaysia and Korea, monetary policy changes and worsening conditions for the issuance of bank bonds also play a significant role in funding liquidity risk.

In Cambodia, changes in regulations have proved to have a significant impact on liquidity in the banking sector. The changes include the increase in reserve requirement and minimum capital requirement, leading to severe liquidity tightening. In Korea, the main factor affecting liquidity problems is a sudden rise in uncertainty. Following the global financial crisis, the impact was felt in the bond markets where the outflow of foreign investors led to a shortage of liquidity in the bond market. Korean banks' high loan to deposit ratios and their reliance on bond issuance, have provided further reasons for foreign investors' loss of confidence. The loss of confidence as a result of the sudden rise in uncertainty is also an important factor affecting liquidity in Malaysia, causing deposit withdrawals from banks in both the 1997 Asian and the recent subprime crisis. The blanket deposit guarantee announcement, however, have brought back financial stability. In the case of Sri Lanka, there was a collapse of some unauthorised financial firms in the mid 2008, causing public confidence to deteriorate and a resultant deposit drain of some financial firms.

Overall, however, it is interesting to note that in SEACEN countries, market and funding problems did not materialise in the most recent crisis episodes, including the subprime crisis. Liquidity risk mainly arose from the liability side of the banks' balance sheet, e.g. deposits drain and shortage of wholesale funding. Although there were some pressures from liquidity problems, a number of policy choices which included those

on reserve requirement, extensive report submissions, banks' own balance sheet decisions as well as deposit insurance have helped cushion the effect of the adverse factors on the financial system in these countries.

Figure 7
Factors Affecting Liquidity

Factors affecting funding liquidity	
Inadequate liquidity risk management	CB,MY,NP,SL, TW ,TH ID,BR,VN (9)
Lack of contingency funding plan	MN,NP,SL, ID (4)
Regulatory changes	CB, MY ,NP,PH,TH (5)
Stresses in local financial market	MY ,NP,PH (3)
Contagion effect	KR,MY,PH, TW ,TH, ID (6)
Asset-liability mismatch	CB, KR , MY,MN,NP,PH, SL ,TW, TH, ID , BN,VN (12)
Lack of alternative funding	KR,MY,NP, SL ,ID,VN (6)
Loss of confidence	CB,MY, TW ,TH, ID (5)
Others (Increase in margin of currency swap)	KR (1)
Factors affecting market liquidity	
Inadequate liquidity risk management	MY,NP, SL , TW ,BR,VN (6)
Global financial crisis	KRMY ,PH,TH, ID (5)
Stresses in local financial market	KRMY ,PH, ID (4)
Changes in monetary policy	MY ,NP,SL,TH (4)
Lack of Liquidity in interbank and bond markets	KR.MY ,NP,PH,TH, ID (6)
Loss of confidence	KR, TW ,TH, ID (4)
Contagion effect	PH, TW ,TH (3)

Note: CB=Cambodia, KR=Korea, MY=Malaysia, MN=Myanmar, NP=Nepal, PH=Philippines,

SL=Sri Lanka, TW=Taiwan, TH=Thailand, ID=Indonesia; BN=Brunei, VN=Vietnam

Bold = important factor in that country; Number in parenthesis refer to total number of countries

5. The Role of Central Bank and Liquidity Risk Management

5.1 Why Should Central Banks Be Concerned About Market Liquidity?

Financial market participants are usually quite capable of developing institutional arrangements to generate liquid conditions in their respective markets. However, the benefits that deep and liquid markets offer to the broader economy are regarded as public goods. It is possible that even if all financial market participants prefer to have liquid market, individually they may sometimes lack the appropriate incentives for behaviour that would maintain adequate liquidity especially in stressed periods. This situation gives rise to the role of central banks in providing liquidity to the market for maintaining financial stability.

Central banks usually have an interest in the liquidity of government securities markets for a variety of reasons. First, outright purchases and

repos of government securities are important instruments of monetary policy. If market liquidity is not adequate, central banks may not be able to provide or absorb the necessary amount of liquidity smoothly via their open market operations. Second, extracting appropriate information, such as the term structure of yields and implied inflation expectations, from prices in government securities markets is crucial for monetary policy conduct. Third, liquidity in asset markets improves the ability of financial institutions to adjust their balance sheet position quickly in response to shocks. A deeper and more liquid money market also strengthens the transmission effects of the central bank's monetary policy operations on other financial markets.

As discussed earlier, funding liquidity risk is inherent in the banking system and that under incomplete markets and asymmetric information, a vicious cycle can develop, leading to a systemic crisis. The central bank's main function is to alleviate systemic liquidity risks in its role as guarantor of the banking system. These mechanisms involve routine liquidity provision and emergency liquidity provision, apart from their role in supervision and regulation setting.

Central bank interventions can provide temporary injections of liquidity aimed at breaking the link between market and funding liquidity risk, thwarting a downward liquidity spiral. This can be executed quickly, until other more time-demanding tools, i.e. supervision and regulation can be adjusted to prevent future risk. However, there is no tailor-made standardised intervention and policy for countries. In providing liquidity to the system, a central bank can increase credit risk in its portfolio, depending on types of the collateral accepted, and increase the risk of compromising its monetary policy objectives.

In the SEACEN countries, central banks provide both routine and emergency liquidity facilities to banks. The tools used by these central banks for liquidity provision include end-of-day facilities, discount window operations, payment system facilities, repo facilities and swap facilities (Table 8). The most commonly used tools are discount windows and repo facilities while the most common types of eligible collateral are government bonds, followed by central bank bonds and bank loans. In the case of Korea and Taiwan, there is scope for other assets to be accepted as collaterals pending the allowance of the Monetary Policy Committee in emergency situations. Most of the central banks do not have plans to expand eligible securities, reflecting in part the relative less exposure to the global financial crisis (Table 9).

Table 8
Tools of Central Banks' Liquidity Provision

	End-of-day standing facilities	Discount window operations	Payment system facilities	Repo facilities	Swap facilities
Cambodia	✓	X	X	X	X
Korea	✓	✓	✓	✓	✓
Malaysia	✓	✓	✓	✓	✓
Myanmar	X	✓	X	X	X
Nepal	X	✓	X	✓	X
Philippines	X	✓	✓	✓	✓
Sri Lanka	✓	✓	X	✓	X
Taiwan	✓	✓	✓	✓	✓
Thailand	✓	✓	✓	✓	✓
Vietnam	✓	✓	✓	✓	✓

✓ Tool available for liquidity provisioning

X Tool no available liquidity provisioning

Table 9
Type of Collaterals Accepted

	Corporate bonds	Commercial papers	Mortgaged-back securities	Government bonds	Bank loans	Equities	Central bank bonds	Others	Plan to expand collaterals
Cambodia	X	X	X	✓	✓	X	✓	X	X
Korea	X	X	X	✓	X	X	X	✓ 1/	X
Malaysia	X	X	X	✓	X	X	✓	X	X
Myanmar	X	X	X	✓	X	X	X	X	X
Nepal	X	X	X	✓	X	X	✓	X	X
Philippines	✓	✓	X	✓	✓	X	X	X	X
Sri Lanka	X	X	X	✓	X	X	X	X	X
Taiwan	X	X	X	✓	X	X	✓	✓ 1/	X
Thailand	X	X	X	✓	X	X	✓	X	✓
Brunei	X	X	X	✓	X	X	X	X	✓
Vietnam	X	X	X	✓	✓	X	✓	X	X

Note: 1/ This refers to other assets approved by central bank to be eligible collateral

✓ Asset accepted as collateral

X Asset not accepted as collateral

5.2 Liquidity Supervisory Practices

The global financial crisis was preceded by an extended period of abundant liquidity in the financial system and therefore liquidity risk and its management did not receive the same attention as other types of risks. However, one important feature of the crisis was the weakness in managing liquidity risk. To strengthen risk management in this area, the Basel Committee on Banking Supervision (BCBS) has issued a report highlighting inadequacies in market practices in February 2008 (BCBS, 2008a). These weaknesses include, for example, underestimation of the funding requirements of contingent obligations, failure to consider potential systemic liquidity strains in stress tests and insufficient treatment of individual products.

Later in September 2008, bank regulators issued another revised set of principles on how banks should manage liquidity (BCBS, 2008b). These sound principles provide supervisory expectations on the key elements of a framework for liquidity risk management of banks.¹¹ The principles consist of the following elements -board and senior management oversight; the establishment of policies and risk tolerance; the use of liquidity risk management tools such as comprehensive cash flow forecasting, limits and liquidity scenario stress testing; the development of contingency funding plans; and the buffer of high quality liquid assets to meet contingent liquidity needs. Supervisors are expected to evaluate both the sufficiency of bank's liquidity risk management and liquidity exposure. Moreover, supervisors are expected to take action in addressing the bank's risk management inadequacies or excess exposure to protect depositors and ensure financial stability (See Appendix B).

In December 2009, the BCBS issued a consultative document on international framework for liquidity risk measurement, standard and monitoring, in response to recommendations of the G20 that would like to have a global framework for promoting stronger liquidity buffers of banks by 2010.¹² Banks are expected to meet these standards and adhere to all the principles set out in the September 2008 Sound Principles. Essentially, there are

11. For further detail, please see BCBS (2008b), Principles for Sound Liquidity Risk Management and Supervision, September.

12. Declaration on Strengthening the Financial System, London Summit, 2 April 2009.

two standards for liquidity risk, namely the Liquidity Coverage Ratio and the Net Stable Funding Ratio (See Appendix B for details). The liquidity coverage ratio identifies the amount of high quality liquid assets a bank can use to offset the net cash outflows it would encounter under severe short-term stress scenarios. The objective is to promote the short-term resiliency of banks by ensuring that they have adequate high quality liquid resources to survive extreme stress scenario lasting for one month.¹³ The net stable funding (NSF) ratio sets a minimum acceptable amount of stable funding based on the liquidity characteristics of a bank's assets and activities over a one year period. The objective is to promote resiliency over longer-term time horizons by creating incentives for banks to fund their activities with more stable sources of funding.¹⁴

To further strengthen and promote consistency in international liquidity risk supervision, the Committee has also developed a minimum set of monitoring tools to be used by supervisors. This is hoped to improve the heterogeneity in quantitative measures to monitor the liquidity risk profiles of banks globally. The proposed set of monitoring tools includes the following - contractual maturity mismatch (provides an initial, simple baseline of contractual commitments), concentration of funding (involves analysing concentrations of wholesale funding), available unencumbered assets (measures the amount of unencumbered assets a bank has which could potentially be used as collateral for secured funding), market-related monitoring tools (includes monitoring market-wide data on asset prices and liquidity, credit default swap (CDS) spreads and equity prices, etc.).

For the SEACEN countries, the objectives for liquidity supervision are similar across countries, although there are differences in how these objectives translate into rules and guidelines. Broadly speaking, high-level approaches to supervising liquidity risk are common across countries - banks are expected to have specific policies to address liquidity risk; the use of contingency funding plans (CFP) is commonplace; all countries recognise the importance of stress testing; and all countries require banks to report information regularly to supervisors. Countries differ in the extent to which requirements are prescribed and standardised. The differences are highlighted below through a review of the individual components of national liquidity regimes.

13. Liquidity coverage ratio = Stock of high quality liquid assets/Net cash outflows over a 30-day time period $\geq 100\%$.

14. Net stable funding = Available amount of stable funding/Required amount of stable funding $> 100\%$

5.2.1 Liquidity Policies

Almost all countries expect banks to document liquidity policies in order to set up the internal strategy for managing liquidity risk. Broadly speaking, banks' liquidity policies are expected to put in place the internal processes to measure, monitor and control liquidity risk. Various countries require some combination of the following items to be included in their policies: the requirement for adequate information systems; required processes to assess future cash flows and net funding requirements; stress tests and the setting of internal limits. In Malaysia, recent practice is associated with the New Liquidity Framework (NLF), which was first adopted in 1998. The NLF measures liquidity needs on a monthly basis and mismatch between assets and liabilities is evaluated. In addition, banks are expected to manage reliance on funding source and maintain contingency back-up lines.

5.2.2 Contingency Funding Plans

Contingency funding plans are used to establish banks' strategies for dealing with stressed periods. All countries expect banks to have pre-established contingency arrangements, although the formality of the requirement varies. Similar to overall liquidity policies, there do not appear to be fundamental differences in national approaches. Rather, diversity can be seen in the detail of the requirements. The CFP in all countries comprises details about sources of emergency liquidity and most have specified triggers for launching the plan (Table 10). Few, however, have specified persons in charge and public relation handling. In Korea, banks also have multi-stage contingency plans where banks undertake appropriate crisis response when liquidity indicators fall or rise above some threshold level. In Sri Lanka, although CFP is required, only a few banks have an effective contingency plan. Nepal is the only country where contingency funding plan is neither required nor suggested.

Table 10
Contingency Funding Planning

	CFP is required	Components of CFP					
		Coordination and reporting procedures	Persons in charge	Sources of emergency liquidity	Public relations	Customer handling	Triggers for launching the plan
Cambodia	✓ 2/	✓	X	✓	X	X	X
Korea	✓	✓	X	✓	X	✓	✓
Malaysia	✓✓ 1/	X	X	X	X	X	X
Myanmar	✓✓	X	X	✓	X	X	X
Nepal	X	X	X	X	X	X	X
Philippines	✓✓	✓	X	✓	X	✓	✓
Sri Lanka	✓✓	X	X	✓	X	X	✓
Taiwan	✓	✓	✓	✓	✓	✓	✓
Thailand	✓	✓	✓	✓	✓	✓	✓
Indonesia	✓✓	✓	✓	✓	✓	X	✓
Brunei	✓✓	✓	✓	X	✓	✓	✓
Vietnam	✓✓	X	X	X	X	X	X

Note: For the first column, 1/ ✓✓ refers to mandatory requirement; 2/ ✓ refers to prudential liquidity guideline

5.2.3 *Stress Tests and Scenario Analyses*

Stress tests and scenario analyses aim to identify potential weaknesses or vulnerabilities in a bank's liquidity position, enabling changes to be put in place to counter those weaknesses. While all surveyed central banks, with the exception of Nepal, require or suggest banks to have liquidity contingency funding plan, this does not apply to stress testing (Table 11). A number of surveyed countries currently do not require banks to conduct stress tests as part of their liquidity risk management but will, however, soon do so. Malaysia, Taiwan, Indonesia and Vietnam have already implemented stress testing as part of mandatory requirement. In Korea and Thailand, while stress testing is not required, it forms part of prudential liquidity guidelines and banks should incorporate the results of the test in their liquidity risk management strategies and contingency funding plans. Countries where stress testing is neither mandatory nor suggested include Myanmar, Nepal, Philippines, Sri Lanka and Brunei. However, many have plans to implement stress testing in 2010. In most countries, specification of survival period under liquidity shortage situation is not required. The frequency of conducting stress tests in countries that have implemented them, varies widely from monthly to yearly.

Table 11
Stress Test in Banking Sector

	Stress test is required	Frequency	Survival period	Plan to implement Stress test
Cambodia	✓ 2/	X	X	Already implement
Korea	✓	Mostly monthly	X	Already implement
Malaysia	✓✓ 1/	Semi annually	✓	Already implement
Myanmar	X	X	X	2010
Nepal	X	X	X	2010
Philippines	X	X	✓	2010
Sri Lanka	X	X	X	2010
Taiwan	✓✓	Yearly	X	Already implement
Thailand	✓	Quarterly	X	Already implement
Indonesia	✓✓	Monthly	X	Already implement
Brunei	X	X	X	X
Vietnam	✓✓	Not specify	X	Already implement

Note: For the first column, 1/ ✓✓ refers to mandatory requirement; 2/ ✓ refers to prudential liquidity guideline

5.2.4 The Setting of Limits

All SEACEN countries require banks to maintain required reserves (Table 12). However, some countries have suggested for banks to set other internal limits or targets. These may include target holdings of liquid assets, limits on maturity mismatches or limits on the reliance on a particular funding source. Where targets are set for different purposes, their structures understandably vary considerably. Several SEACEN countries prescribe explicit limits or target ratios as part of the prudential guidelines and most countries have set liquidity ratio for banks. On the contrary, only a few countries have set limits on funding concentration or target positive gaps for some time buckets. These quantitative limits, although varying widely across countries, can help constrain the amount of liquidity risk that banks take. In particular, they can help ensure that banks are adequately prepared for stressed conditions or serve as early warning indicators of stress or vulnerability.

Table 12
The Setting of Limits

	Reserve requirement	Minimum holdings of liquid assets	Liquidity ratio	Limits on maturity mismatches	Limits on funding concentration	Target positive gap for some time buckets	Others
Cambodia	✓✓ 1/	X	✓ 2/	✓	X	✓	X
Korea	✓✓	X	✓	✓	X	✓	✓
Malaysia	✓✓	✓	X	✓	X	✓	X
Myanmar	✓✓	X	✓	X	X	X	X
Nepal	✓✓	✓	✓	X	✓	X	X
Philippines	✓✓	✓	✓	✓	✓	X	X
Sri Lanka	✓✓	✓	X	X	X	X	X
Taiwan	✓✓	✓	✓	✓	X	✓	X
Thailand	✓✓	✓	X	✓	✓	X	X
Indonesia	✓✓	✓	X	X	X	X	X
Brunei	✓✓	X	X	X	X	X	X
Vietnam	✓✓	X	✓	X	✓	X	✓

Note: For all columns, 1/ ✓✓ refers to mandatory requirement; 2/ ✓ refers to prudential liquidity guideline

5.2.5 Reporting Requirements

SEACEN supervisors typically require banks to report information on their liquidity positions for a variety of reasons (Table 13). Most regulators use standardised forms, with prescribed definitions and behavioural assumptions. Liquidity disclosure to central banks normally include deposit concentration, loan to deposit ratio, short-term liabilities breakdown, maturity gap report, liquid assets breakdown, liquidity ratios, liquidity gap report and stress test. Most have to be submitted on a monthly basis, with the exception of Indonesia where most reports are submitted daily.

Table 13
Liquidity Disclosure to Central Banks

	Report submission	Components for report submission							
		Deposit concentration	Loan to deposit ratio	Short-term liabilities breakdown	Maturity gap report	Liquid assets breakdown	Liquidity ratios	Liquidity gap report	Stress test
Cambodia	✓✓	M	M	M	M	M	M	M	X
Korea	✓✓1/	X	X	M	M	M	W	M	X
Malaysia	✓✓	M	M	M	M	M	M	M	Half Y
Myanmar	✓✓	X	W	W	X	W	W	X	X
Nepal	✓✓	M	M	W	Q	M,W	M,Q	Q	X
Philippines	✓✓	M, Q	M, Q	M, Q	M, Q	M, Q	M, Q	M, Q	X
Sri Lanka	✓✓	W	X	X	M	X	M		X
Taiwan	✓✓	M	M	X	M	M	M	M	X
Thailand	✓✓	M	M	M	M	M	M	M	X
Indonesia	✓✓	D	W, M	D	D	D	D	M	M
Brunei	✓✓	M	M	M	X	M	M	X	X
Vietnam	✓✓	X	X	X	X	X	D, W	X	X

Note: For the first column, 1/ ✓✓ refers to mandatory requirement
D= daily; W=weekly; M=monthly; Q=Quarterly; Y=yearly

To conclude, there appears to be diversity in national liquidity regimes as well as implications to this diversity. In part, such differences result from heterogeneity in financial market conditions and differences in the national liquidity regimes. Diversity also arises from linkages to other factors which govern the resilience of the banking system to severe liquidity stress but may fall outside the legal mandate of supervisors. These factors include nationally determined factors such as deposit insurance arrangements, and central bank credit and collateral policies, including intraday, standing facility, or emergency liquidity assistance arrangements, as well as the structure of the banking sector. In addition, liquidity regimes are affected by policy choices made by national authorities about the desired resilience of banks to liquidity stress, which in turn affect banks' decision regarding liquid assets that they should hold to attain the desired resilience.

6. Conclusion and Policy Recommendation

The 2008 global financial crisis clearly demonstrates that banks funded primarily by retail deposits have faced less liquidity pressure than those more dependent on wholesale funds. In the US, the loss of investor confidence in a wide range of structured securities markets led to risks flowing to banks' balance sheets. The initial shock in credit markets was transmitted through a fall in asset market liquidity, which led to an increase in funding risk. Money markets tightened internationally as banks built up liquidity to meet contingent claims. Banks in the SEACEN countries, on the contrary, remained resilient to the global financial crisis as a result of ample liquidity and traditional banking businesses pursued prior to the crisis. Banks in this region are mostly dependent on deposit and loan businesses, and hence have a range of defenses to a sudden decline in the availability of wholesale funds. In this context, the first lesson learned is that a market-based financial system relies more, and not less, on funding liquidity.

In general, banks have several counter-measures to liquidity pressures. One is to transform illiquid assets into cash. However, this approach could fail when the source of the change in market conditions is a lowering of demand for securities. Another approach is to bid for higher retail deposits. That is likely to take time as many individual retail savers react slowly to changes in relative interest rates. In addition, in an environment of general liquidity strain, competitors are likely to do the same to protect their market share. The impact on each bank in the medium term is likely to be limited. Therefore, faced with restrictions on raising liquidity, a bank must respond to a funding shortfall by slowing or even reducing its lending to households and corporate customers. Retrenchment in lending can have significant implications for the wider economy, as a reduced amount of funds are available to companies. These defences suffer from a common shortcoming. While they may work well when an individual bank is facing funding pressure, it can become challenging when every bank attempts to use them at the same time when liquidity pressures are widespread.

Therefore, there is one last line of defence left, which is what banks in SEACEN countries have done - to hold a buffer of reliable high-quality liquid assets such as Treasury bills or other government securities, which can be drawn on immediately and directly in the event of a sudden withdrawal of market liquidity or an unexpected increase in funding requirement. Based on this experience, the second lesson, therefore, is

that consideration should be given to maintaining the holdings of very high-quality liquid assets that can provide enough reliable reserves in stressed period.¹⁵ It should be noted, however, that only amounts in excess of the minimum requirement can truly act as buffers. In times of liquidity stress, the minimum requirement could add to, rather than offset, liquidity imbalance. In addition, although liquidity buffers are generally beneficial, it can also act as a constraint on banks' profitability and efficient risk management.

Another lesson drawn from the recent episode is the disclosure practices in relation to liquidity risk management objectives. Strict and relatively comprehensive liquidity report submissions required by the central banks in the region has enabled them to be proactive on liquidity risk management. In times of heightened uncertainty, a lack of information can lead to defensive reactions by market counterparties. To eliminate systemic liquidity risk, greater transparency of liquidity management practices is needed. Close supervision and regulation of banks are found to be the fundamental weapons against systemic liquidity crises and have helped tackle the root of liquidity risks by minimising asymmetric information and moral hazard through effective monitoring mechanisms. These practices have also made it easier for central banks in the region to distinguish between solvent and illiquid banks and therefore impose liquidity cushions on the ones most in need.

In addition, this study reveals that there are measurement and management challenges. There is no simple and representative summary measure of liquidity risks assumed by a given bank and any single definition of such a complex array of risks will necessarily be approximate. Banks use a variety of liquidity measurement and management techniques in attempts to monitor their liquidity positions. Although specific methods vary by banks, common liquidity measures used by banks in this region include liquidity ratio, cash flow gaps and some minimum limits on liquid asset and reserve holdings. It is also clear that banks in SEACEN countries

15. The threshold for this should be bank-specific as each bank is different in its customer, product and balance sheet structure. Good liquidity risk management should also include well-designed liquidity risk reporting, robust contingency funding plan and rigorous stress testing in order to control risk profile within acceptable limits and to prepare a bank for any liquidity crisis that might occur.

have paid more attention to improving liquidity management over the past few years, especially after the global financial crisis. There has been a heightening of risk awareness and many banks have formalised their liquidity risk management processes. In terms of liquidity environment, the Asian experience has highlighted the important role played by deposit insurance in containing runs on banks. Although deposit insurance schemes, narrowly defined as those designed to protect retail depositors, can perform a variety of roles, the one they are considered most relevant for is that of preventing bank runs. An important lesson learned is that there should be improvements made in funding markets and public confidence by broadening the scope of bank guarantees to ensure future financial stability, especially during crisis time.¹⁶

For central banks, the opening of the lending window more broadly, and ensuring the smooth functioning of the short-term money market as well as government bond market are important in effective liquidity management. Although the existence of central bank lending facilities can be viewed as a double-edged sword as it can cause a “moral hazard” problem, experiences in this region indicate that banks usually use central bank liquidity only as a last resort to avoid negative interpretation regarding their financial health. It is also crucial for central banks to acknowledge systemic risk due to liquidity spirals and consider the system as a whole, as opposed to each institution in isolation. In terms of liquidity supervision, the objectives and high-level approach of central banks are similar across countries. Banks are expected to address liquidity risk by having liquidity policies, internal liquidity guidelines and contingency funding plans, as well as regular reporting to supervisors. All countries recognise the importance of stress testing. The main differences lie in the way the requirements are prescribed and standardised.

In concluding, this study has demonstrated the importance of liquidity in financial system stability. Financial innovation and market development have highlighted the significance of ever present liquidity risks and should, therefore, be taken into consideration when relevant policy decisions are made. If the problem is a liquidity spiral, improvements should be made for the funding liquidity of banks, the main players in the market, in order to prevent a systemic crisis. Normalcy in the region is

16. In normal time, the blanket guarantee scheme provided to banks may create moral hazard problems and hence it should be applied only in emergency situation when public confidence in the banking system significantly deteriorates.

also not a reason for complacency. Banks in SEACEN countries, having learned their lessons from the past Asian crisis, entered the global crisis in good shape with abundant liquidity. This, however, may not necessarily continue to be the case in the future. And as capital markets become more developed, banks may increasingly rely on wholesale funding, making the system more vulnerable to liquidity risk.

Going forward, there can be little doubt that regulators will pay far more attention to liquidity management than they have in the past. More resources will likely be devoted to the monitoring and management of liquidity by banks. The diversity in national liquidity regimes, reflecting the heterogeneity in financial market conditions, should be taken into account when designing liquidity management strategy. Factors such as deposit insurance arrangements, central bank lending policies and banks' own balance sheet choices are also crucial in determining banks' vulnerability to liquidity risks. Therefore, to build strong defences against future liquidity crisis, there is a need for a good understanding of a country's specific regulatory policies, the nature of banks' assets and liabilities as well as the economic and liquidity environment in which they operate.

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Table A1: Definition of Liquid Assets and Short-term Liabilities

	Liquid assets	Short-term liabilities
Cambodia	Cash and placements with banks	All liabilities that mature in less than 1 year
Korea	Assets matured in less than 1 year	Liabilities matured in less than 1 year
Malaysia	Securities issued/guaranteed by BNM or gov. bonds issued by 4 gov linked institutions, banker 's acceptance, NCD, residential MBS, AAA rating PDS, equities, available credit line 's	On and off balance sheet liabilities maturing in 1 year 's time
Myanmar	Freely transferable assets, free from any charge or lien, and of the kind and amount specified by central bank	Liabilities that mature in less than one year.
Nepal	Cash (domestic currency) in vault, Balance with Nepal Rastra Bank, Foreign currency in vault, Balance held abroad and Cash in transit	All liabilities that mature within a year is considered to be short-term liabilities. However, the NRB does not compile and publish SR liabilities.
Philippines	The sum of cash and due from banks and investments (net of allowance for probable losses) exclusive of equity investments (net of allowance for probable losses)	Balance sheet liabilities payable within 1 year 's time
Sri Lanka	Cash, balances with licensed commercial banks, money at call in Sri Lanka, treasury bills and securities issued or guaranteed by the Government of Sri Lanka which have a maturity not exceeding one year, goods receipts, import and export bills, Treasury Bonds issued under Section 21A of the Registered Stock and Securities Ordinance, Commercial Paper/Promissory Notes, Sri Lanka Development Bonds issued under the Foreign Loans Act, No. 29 of 1957, International Sovereign Bonds issued in 2007 by the Government of Sri Lanka, Securities/Bonds issued by Foreign Governments maturing within 1 year, Other debt securities and Bonds, maturing within 1 year, which are traded on an exchange, or have an investment grade rating, or are backed by a standby credit facility from a banking institution.	Liabilities maturing in less than 1 year
Taiwan	Excess reserves, net due from banks, CD issued by central bank, re-deposit less than 1 yr, gov bonds, treasury bills, NCD, bank debentures, banker 's acceptance, commercial paper, corporate bonds, other liquid assets approved by central bank	All deposits, Net dues to banks in call loan market, Bill/bonds sold under repurchase agreements
Thailand	Cash on hand, current a/c at BOT, deposit at other banks, gov bond, BOT bond	All deposits, foreign borrowing with less than 1 yr, borrowing with embedded derivative

Table A2: Market Liquidity Stress

	Tightened liquidity in inter-bank market	Tightened liquidity in bond market	Difficulty in liquidating financial asset	Significant sale of assets to raise liquidity	Others
Cambodia	X	X	X	X	X
Korea	✓	✓	X	X	X
Malaysia	✓	✓	X	X	X
Myanmar	X	X	X	X	X
Nepal	X	X	X	X	X
Philippines	✓	X	X	X	X
Sri Lanka	X	X	X	X	X
Taiwan	X	X	X	X	X
Thailand	✓	✓	X	X	X
Indonesia	✓	✓	X	X	X
Vietnam	X	X	X	X	X

Table A3: Funding Liquidity Stress

	Funding problems	Deposit outflows	Significant weakening of financial conditions	Credit rating downgrade	Declining confidence	Others
Cambodia	X	✓	✓	X	✓	X
Korea	✓	X	X	X	✓	✓
Malaysia	X	✓	X	X	X	X
Myanmar	X	X	X	X	X	X
Nepal	X	X	X	X	X	X
Philippines	X	✓	X	X	X	X
Sri Lanka	X	✓	X	X	X	X
Taiwan	X	✓	X	✓	✓	X
Thailand	X	X	X	X	X	X
Indonesia	✓	X	X	✓	✓	X
Vietnam	X	X	X	X	X	X

Table A4: Is There Deposit Insurance?

	Yes	No	Likely implementation date
Cambodia		X	No plan
Korea	✓		
Malaysia	✓		
Myanmar		X	After 2010
Nepal		X	After 2010
Philippines	✓		
Sri Lanka		X	After 2010
Taiwan	✓		
Thailand	✓		
Indonesia	✓		
Brunei		X	After 2010
Vietnam	✓		

Principles for the Management and Supervision of Liquidity Risk¹

Fundamental principle for the management and supervision of liquidity risk

Principle 1: A bank is responsible for the sound management of liquidity risk. A bank should establish a robust liquidity risk management framework that ensures it maintains sufficient liquidity, including a cushion of unencumbered, high quality liquid assets, to withstand a range of stress events, including those involving the loss or impairment of both unsecured and secured funding sources. Supervisors should assess the adequacy of both a bank's liquidity risk management framework and its liquidity position and should take prompt action if a bank is deficient in either area in order to protect depositors and to limit potential damage to the financial system.

Governance of liquidity risk management

Principle 2: A bank should clearly articulate a liquidity risk tolerance that is appropriate for its business strategy and its role in the financial system.

Principle 3: Senior management should develop a strategy, policies and practices to manage liquidity risk in accordance with the risk tolerance and to ensure that the bank maintains sufficient liquidity. Senior management should continuously review information on the bank's liquidity developments and report to the board of directors on a regular basis. A bank's board of directors should review and approve the strategy, policies and practices related to the management of liquidity at least annually and ensure that senior management manages liquidity risk effectively.

Principle 4: A bank should incorporate liquidity costs, benefits and risks in the internal pricing, performance measurement and new product approval process for all significant business activities (both on- and off-balance sheet), thereby aligning the risk-taking incentives of individual business lines with the liquidity risk exposures their activities create for the bank as a whole.

1. See "Principles for Sound Liquidity Risk Management and Supervision", BCBS (2008b) for more details.

Measurement and management of liquidity risk

Principle 5: A bank should have a sound process for identifying, measuring, monitoring and controlling liquidity risk. This process should include a robust framework for comprehensively projecting cash flows arising from assets, liabilities and off-balance sheet items over an appropriate set of time horizons.

Principle 6: A bank should actively monitor and control liquidity risk exposures and funding needs within and across legal entities, business lines and currencies, taking into account legal, regulatory and operational limitations to the transferability of liquidity.

Principle 7: A bank should establish a funding strategy that provides effective diversification in the sources and tenor of funding. It should maintain an ongoing presence in its chosen funding markets and strong relationships with funds providers to promote effective diversification of funding sources. A bank should regularly gauge its capacity to raise funds quickly from each source. It should identify the main factors that affect its ability to raise funds and monitor those factors closely to ensure that estimates of fund raising capacity remain valid.

Principle 8: A bank should actively manage its intraday liquidity positions and risks to meet payment and settlement obligations on a timely basis under both normal and stressed conditions and thus contribute to the smooth functioning of payment and settlement systems.

Principle 9: A bank should actively manage its collateral positions, differentiating between encumbered and unencumbered assets. A bank should monitor the legal entity and physical location where collateral is held and how it may be mobilised in a timely manner.

Principle 10: A bank should conduct stress tests on a regular basis for a variety of short-term and protracted institution-specific and market-wide stress scenarios (individually and in combination) to identify sources of potential liquidity strain and to ensure that current exposures remain in accordance with a bank's established liquidity risk tolerance. A bank should use stress test outcomes to adjust its liquidity risk management strategies, policies, and positions and to develop effective contingency plans.

Principle 11: A bank should have a formal contingency funding plan (CFP) that clearly sets out the strategies for addressing liquidity shortfalls in

emergency situations. A CFP should outline policies to manage a range of stress environments, establish clear lines of responsibility, include clear invocation and escalation procedures and be regularly tested and updated to ensure that it is operationally robust.

Principle 12: A bank should maintain a cushion of unencumbered, high quality liquid assets to be held as insurance against a range of liquidity stress scenarios, including those that involve the loss or impairment of unsecured and typically available secured funding sources. There should be no legal, regulatory or operational impediment to using these assets to obtain funding.

Public disclosure

Principle 13: A bank should publicly disclose information on a regular basis that enables market participants to make an informed judgement about the soundness of its liquidity risk management framework and liquidity position.

The role of supervisors

Principle 14: Supervisors should regularly perform a comprehensive assessment of a bank's overall liquidity risk management framework and liquidity position to determine whether they deliver an adequate level of resilience to liquidity stress given the bank's role in the financial system.

Principle 15: Supervisors should supplement their regular assessments of a bank's liquidity risk management framework and liquidity position by monitoring a combination of internal reports, prudential reports and market information.

Principle 16: Supervisors should intervene to require effective and timely remedial action by a bank to address deficiencies in its liquidity risk management processes or liquidity position.

Principle 17: Supervisors should communicate with other supervisors and public authorities, such as central banks, both within and across national borders, to facilitate effective cooperation regarding the supervision and oversight of liquidity risk management. Communication should occur regularly during normal times, with the nature and frequency of the information sharing increasing as appropriate during times of stress.

International Framework for Liquidity Risk Measurement, Standards and Monitoring²

Regulatory standards

Two regulatory standards for liquidity risk which have been developed to achieve two separate but complementary objectives. The first objective is to promote the short-term resiliency of the liquidity risk profile of institutions by ensuring that they have sufficient high quality liquid resources to survive an acute stress scenario lasting for one month. The Committee developed the Liquidity Coverage Ratio to achieve this objective. The second objective is to promote resiliency over longer-term time horizons by creating additional incentives for banks to fund their activities with more stable sources of funding on an ongoing structural basis. The Net Stable Funding Ratio has been developed to capture structural issues related to funding choices.

Liquidity Coverage Ratio

The liquidity coverage ratio identifies the amount of unencumbered, high quality liquid assets an institution holds that can be used to offset the net cash outflows it would encounter under an acute short-term stress scenario specified by supervisors. The specified scenario entails both institution-specific and systemic shocks built upon actual circumstances experienced in the global financial crisis. The scenario entails:

- a significant downgrade of the institution's public credit rating;
- a partial loss of deposits;
- a loss of unsecured wholesale funding;
- a significant increase in secured funding haircuts; and
- increases in derivative collateral calls and substantial calls on contractual and noncontractual off-balance sheet exposures, including committed credit and liquidity facilities. As part of this metric, banks are also required to provide a list of contingent liabilities (both contractual and non-contractual) and their related triggers.

Net Stable Funding Ratio

The net stable funding (NSF) ratio measures the amount of longer-term, stable sources of funding employed by an institution relative to the liquidity profiles of the assets funded and the potential for contingent

2. See "International framework for liquidity risk measurement, standards and monitoring, BCBS (2009) Consultative document, for more details.

calls on funding liquidity arising from off-balance sheet commitments and obligations. The standard requires a minimum amount of funding that is expected to be stable over a one year time horizon based on liquidity risk factors assigned to assets and off-balance sheet liquidity exposures. The NSF ratio is intended to promote longer-term structural funding of banks' balance sheets, off-balance sheet exposures and capital markets activities.

Monitoring tools

At present, supervisors use a wide range of quantitative measures to monitor the liquidity risk profiles of banking organisations. A survey of Basel Committee members conducted in early 2009 identified that more than 25 different measures and concepts are used globally by supervisors. These include both contractual and bank-estimated cash flows and maturity gaps across different time horizons; granular assessments of the liquidity implications of specific balance sheet profiles; and the use of market data to monitor potential liquidity risks at banks. Such metrics enable monitoring of trends both within banking organisations as well as within financial systems, for a more macroprudential approach to supervision.

To introduce more consistency, the Committee has developed a set of common metrics that should be considered as the minimum types of information which supervisors should use in monitoring the liquidity risk profiles of supervised entities. In addition, supervisors may use additional metrics in order to capture specific risks in their jurisdictions.

The proposed set of monitoring metrics includes the following and may evolve further as the Committee conducts further work. One area in particular where more work on monitoring tools will be conducted relates to intraday liquidity risk.

a. *Contractual maturity mismatch*: As a baseline to gain an understanding of the basic, least complex aspects of a bank's liquidity needs, banks should frequently conduct a *contractual maturity mismatch* assessment. This metric provides an initial, simple baseline of contractual commitments and is useful in comparing liquidity risk profiles across institutions, and to highlight to both banks and supervisors when potential liquidity needs could arise.

b. *Concentration of funding*: This metric involves analysing concentrations of wholesale funding provided by specific counterparties, instruments and

currencies. A metric covering concentrations of wholesale funding assists supervisors in assessing the extent to which funding liquidity risks could occur in the event that one or more of the funding sources are withdrawn. The monitoring of this aspect of liquidity risk mirrors the monitoring of large exposures on the assets side of banks' balance sheets.

c. *Available unencumbered assets*: This metric measures the amount of unencumbered assets a bank has which could potentially be used as collateral for secured funding either in the market or at standing central bank facilities. This should make banks (and supervisors) more aware of their potential capacity to raise additional secured funds, keeping in mind that in a stressed situation this ability may decrease.

d. *Market-related monitoring tools*: In order to have a source of instantaneous data on potential liquidity difficulties, the Committee suggests utilising market-based data as a valuable supplement to the metrics above. Useful data includes monitoring market-wide data on asset prices and liquidity, institution-related information such as credit default swap (CDS) spreads and equity prices, and additional institution specific information related to the ability of the institution to fund itself in various wholesale funding markets and the price at which it can do so.

PART 2

COUNTRY CHAPTERS

LIQUIDITY MANAGEMENT AND MEASUREMENT IN CAMBODIA

by Ouk Sarat¹

1. Overview of Financial System and Commercial Banking Industry in Cambodia

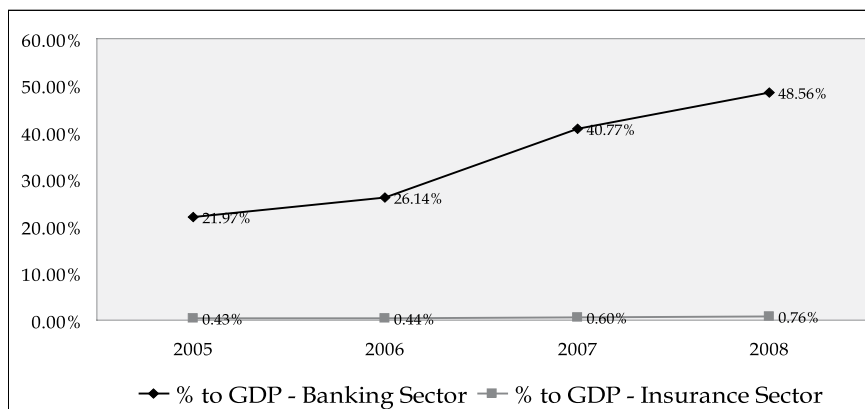
1.1 Structure of Financial System in Cambodia

The financial system in Cambodia is at a rudimentary stage of development. Wrecked by almost three decades of domestic conflict, the basic economic and social infrastructure of Cambodia, including its financial system, were completely destroyed. Cambodia regressed to a barter economy and public knowledge about the role of financial institutions was almost erased. The economy went through a slow and painful process of rehabilitation. The intermediary role of the financial sector was progressively restored and the financial institutions regained public confidence.

Despite this progress, the structure of the financial system remains traditional. By and large, the banking sector is predominant in the financial system. The insurance industry plays a very small role in the financial sector while the money and capital markets are non-existent in Cambodia. The total assets of the banking system accounted for 49% of the GDP while the total assets of the insurance industry contributed less than 1% of the GDP.

1. Author is Section Chief, Banking Supervision Department, National Bank of Cambodia. The views express in this paper are of the author only and does not reflect the views of the NBC.

Figure 1
Total Assets of Banking and Insurance Sector Performance



Source: National Bank of Cambodia

1.2 Characteristics of Banking Sector

The banking sector in Cambodia consists of commercial banks, specialised banks, and micro-finance institutions. The Law on Banking and Financial Institution of the Kingdom of Cambodia defines banking operation as: (1) credit operations for valuable consideration, including leasing, guarantees and commitments under signature; (2) the collection of non-earmarked deposits from the public; and (3) provision of means of payment to customers and the processing of the said means of payment in national currency or foreign exchange. Any institution carrying out all these three activities are deemed to be engaged in banking activities and shall be called commercial banks. Any institution which carries out only one of these three basic activities shall be known as a specialised bank. In practice, specialised banks are only involved in lending activities. Micro-finance institutions also engage in banking activities through the soliciting of deposits and the granting of credits, but their scope of operation is limited within certain thresholds to distinguish the markets of banking and micro-finance.

As of June 2009, the financial system comprises 32 banks, consisting of 26 commercial banks and 6 specialised banks, and with two representative offices of foreign banks. Apart from this, there are 18 licensed micro-finance institutions and 25 rural credit institutions operating country-wide in providing micro-financial services to rural and urban households. For the purpose of this study, only the liquidity measurement and management of commercial banks and specialised banks will be covered.

According to the Law on Banking Financial Institutions, the legal form of banking institutions in Cambodia consists of locally incorporated banks and foreign bank branches. However, the locally incorporated banks could be wholly foreign-owned, major local interest, banks with major foreign interest, foreign bank subsidiaries, and foreign bank branches. Figure 2 below shows the ownership structure of banks in Cambodia.

Figure 2
Structure of the Banking Sector in Cambodia

As of June 2009	Commercial	Specialised	Total	% Total Assets
Major Local interest	6	4	10	47.50%
Major Foreign Interest	9	2	11	6.00%
Foreign Subsidiaries	6	-	6	38.30%
Foreign Branches	5	-	3	8.20%
Total	26	6	30	100.00%
% of Total Assets	98.60%	1.40%		

Source: National Bank of Cambodia

Within the past few years, the number of banks in Cambodia almost doubled. It can be explained by the following factors: (1) The Cambodian economy recorded double-digit growth over the last five years and the momentum is expected to sustain for another decade or more. It means an opportunity promising a huge potential for investors to invest in Cambodia. The banking industry attracted foreign investors due to the large interest margin and high rate of return. (2) The minimum capital requirement for setting up a bank in Cambodia previously was only US\$13 million, a figure which is significantly lower as compared to other countries in the region. Conglomerate investors in Cambodia viewed it affordable for them to establish their own banks to facilitate their business in Cambodia. As a result of this, the minimum capital requirement is now raised to US\$38 million.

Figure 2 above also shows that the proportion of market shares of local and foreign banks are roughly similar, though the number of local banks is only one-third that of the foreign banks. Foreign bank subsidiaries generally perform better than the foreign bank branches probably because the subsidiaries have more autonomy in their operation than the foreign bank branches. The subsidiaries adapt well to the market and have more freedom in targeting their customers, whereas the foreign bank branches generally focus on their existing Head Office customers which are operating in Cambodia. Other foreign banks exist to serve niche markets, particularly financing real estate projects in the country, and some are geared up for the opening of the stock exchange in the country.

Despite a growing number of banks in the system, the banking business remains traditional and the products are not diversified. The major sources and uses of funds are basically customer deposits and credits. Figure 3 below shows the consolidated balance sheet structure of banks. Customer deposits accounted for 65% of the total sources of funds, followed by shareholders equity of 22%. Borrowing from banks consisted of 10% while borrowing from other creditors was relatively low at only 1.52%. Generally, lending between banks was not possible so far as there was no arrangement in place and banks were reluctant to lend to their competitors. Most of the bank borrowings are from their head office. This has been done by the foreign bank subsidiaries and branches to expand their loan portfolios as deposit from customers could not accommodate the need for credit expansion. Borrowings from the central bank to commercial banks especially local banks were relatively small, almost 0% of the total assets. Such lending was provided to support clearing process and not for the purpose of liquidity support.

Credits to customers produced 53% of total assets, the largest application of funds. Due to prudential requirements, the funds maintained at the central bank amounted to 28% of the total assets. Such funds consisted of capital guarantee requirement, reserve requirement for customer deposits, and other correspondent accounts, which are barred of interest for banks. Placements with banks both local and overseas totaled 8% of total assets. These placements are generally maintained for settlement purpose and mostly with foreign counterparts. Lacking liquid financial instruments and considering Cambodia is a cash-based economy, banks hold cash reserves up to 6.84% of their total assets.

Figure 3
Consolidated Balance Sheet Structure

Assets	Percentage	Liabilities & Equity	Percentage
Cash and Gold	6.84%	Owe to NBC	0.5%
Deposits – NBC	28.20%	Owe to Banks	9.95%
Placement with Banks	7.68%	Borrowing Funds	1.52%
Loans to Customers	52.79%	Customer Deposits	64.86%
Securities Investment	0.00%	Other Liabilities	1.56%
Fixed Assets	3.58%		
Other Assets	0.91%	Equity	22.11%
Total Assets	100.00	Total Liabilities & Equity	100.00%

Source: National Bank of Cambodia

1.3 Characteristics of Non-Bank Business

The non-banking business in Cambodia consists of the insurance sector, money and interbank market, and capital market. The insurance sector is relatively small as compared to the banking sector. Six insurance companies, comprising a state-owned company, a joint venture between the state and foreign investor, and four foreign private-owned companies, make up the insurance industry. As of end-2008, the total assets of the insurance sector amounted to less than 2% of the total assets of the banking sector.

Currently, the money and interbank market and the capital market are non-existent in Cambodia. Work is in progress to establish these markets. The National Bank of Cambodia (NBC) is spearheading efforts to establish the money and interbank market. Likewise, the Ministry of Economy and Finance is doing the same to establish the stock exchange.

Pending the establishment of the money and interbank market, the NBC took initiative to issue negotiable central bank security. The NBC also promoted repurchase transactions between banks using central bank securities as collateral. To support the establishment of these arrangements, the NBC plans to introduce a regulation on the issuance of central bank security and to establish a security depository. At the same time, the NBC is set to introduce a regulation on repurchase transaction while related regulations are to be amended, especially regulations with regard to liquidity ratio, liquidity reporting process, and market liquidity management.

The money and interbank market is expected to begin operation once the above arrangements are put in place, which will provide more tools for banks to better manage their liquidity. The availability of money and interbank market will provide additional sources of funds for banks that are more flexible than customer deposits and will provide liquid assets to facilitate bank treasury operations and assets and liabilities management. It will offer more options for banks in setting up their liquidity contingency plan. As medium- and long-term plan, the establishment of money and interbank market will support the implementation of monetary policy through the implementation of open market operation. However, this will need to be consistent with the issuing of government bond to diversify instruments in open market operation.

On the establishment of stock exchange, it involves the building of security infrastructure, investors of securities, issuers of securities, and intermediaries of securities. Most of the work in establishing the security infrastructure has been completed. The legal and regulatory framework relating to securities have been adopted, such as the Law on Government Security, Law on the Issuing and Trading of Non-government Security, Sub-degree on the Organisation and Conduct of the Security and Exchange Commission of Cambodia, and Sub-degree on the Implementation of the Law on Non-government Security. In addition, a series of regulations have been issued to facilitate the operations stock exchange operations and supervision of the stock exchange. The launch of the first ever stock exchange of Cambodia is targeted for end-2009.

The responsibility for propagating the stock market does not rest on the government alone as the promotion of securities investment and trading require investor confidence and transparency of the market. However, with the lack of knowledge and risk in stock market dealing, securities investment is not expected to flourish rapidly. Securities issuers are faced with cumbersome requirements in the listing and issuing process. Not many companies will be listed in the early stage. The development of stock brokerage has made some ground. Many foreign securities firms have set up their base in Cambodia. These firms currently are involved in the education process to raise awareness of the stock market.

2. The Role of Central Bank

2.1 Role and Function of the National Bank of Cambodia

The Law on the Organisation and Conduct of the National Bank of Cambodia designates the NBC as the central bank of Cambodia. The principal mission of the NBC is to determine and direct monetary policy aimed at maintaining price stability in order to facilitate economic development within the framework of the Kingdom's economic and financial policy. The Law defines the general role and functions of the NBC, which are to:

- Determine monetary policy objectives in consultation with the Royal Government taking into consideration the framework of the economic and financial policy of the Kingdom;
- Formulate, implement and monitor monetary and exchange policies aimed at achievement of the determined objectives;

- Conduct regular economic and monetary analysis, make public the results, and submit proposals and measures to the Royal Government;
- License, de-license, regulate and supervise banks and financial institutions and other relevant entities, such as auditors and liquidators;
- Oversee payment systems in the Kingdom and enhance interbank payment mechanisms;
- Act as sole issuer of the national currency;
- Undertake and perform transactions arising from Cambodia's participation in international institutions in the banking, credit, and monetary spheres;
- Establish the balance of payments;
- Participate in the management of external debt and claims;
- Participate in the formation and supervision of the money and financial markets;
- License, de-license, regulate and supervise all those operating in the securities and foreign exchange markets, and market for precious stones and precious metals; and
- Set interest rate.

Apart from these fundamental role and functions, the Law also empowers the NBC to act as liquidity provider to banks and financial institutions. Liquidity provision is extended through banks' accounts via NBC's overdraft facility to help banks meet a temporary liquidity shortage. Even though the Law provides for this accommodation since its promulgation in 1995, in practice, only two banks had availed this facility in the third and fourth quarters of 2008 as the Cambodian economy came under the impact of the global financial crisis. Currently, there is no bank using the overdraft facility of the central bank.

2.2 Central Bank's Recommendation Regarding Liquidity Management

The maintenance of a permanently sound, liquid and solvent condition is the prime responsibility of banks' management. Liquidity is the ability to fund increases in assets and meet obligations as they come due, without incurring unacceptable losses. Banks may default if they are not able to meet their obligations as they come due and liquidity management relies on assumptions of conditions that might not prove stable or reliable over time. Therefore, banks are required to establish prudent policies and assumptions, set a reasonable appetite for liquidity risk

and consider possible adverse market conditions that might impact their liquidity condition. Furthermore, banks are advised to foresee plausible stress scenarios and establish contingency funding plans aimed at coping with such adverse situations and preventing from any payment default situation from arising. Such a default situation might be devastating for banks' reputation.

All these liquidity management principles and risk appetite should result in the holding of a commensurate liquidity buffer and establishment of responsive policies and procedures aimed at rapid deployment of appropriate contingency measures, such as the reduction of loan extensions or utilisation of alternative funding sources, which will help the banks bridge the liquidity gaps. In spite of the safeguards provided, banks sometimes can still be caught in a liquidity crunch due to unforeseen or unprecedented adverse trends or market conditions. To cover this risk, the NBC provides overdraft facilities to these banks, which otherwise are fully solvent, to tide them through a temporary liquidity shortage.

Banks, however, are not allowed to rely on the use of such facilities as an excuse for not practicing prudent liquidity management. In addition, such facilities are not meant to assist banks that are in a state of insolvency or otherwise compromised financial situation. Banks applying for an overdraft facility must be profitable, solvent and fully compliant with the minimum capital requirements and solvency ratio. However, in the event that a bank faces a more severe problem than a temporary liquidity shortage, the NBC may prescribe the bank an appropriate resolution plan.

Once a potential temporary liquidity shortage is identified due to unforeseen adverse trends or market conditions, banks are advised to apply for an overdraft facility from the central bank. When applying for an overdraft facility, banks are required to furnish some information to the central bank, such as liquidity forecasts and estimates of liquidity shortages, assumptions used for the formulation of its liquidity forecasts, discussion of the adverse trends and market conditions that lead to the foreseeable liquidity shortage, the action plan to address the liquidity shortages over the period to be temporarily covered by the overdraft facility applied for, prudent estimates of the timeline necessary to implement the action plan and to reimburse the overdraft facility, foreseeable impact and consequences of the implementation of the envisioned action plan on profitability and on solvency, and assessment on the bank's overall condition. In addition, the banks must provide a list of collateral proposed to the central bank in order to secure the overdraft facility.

The central bank will approve the facility within two working days upon completion of the application. The overdraft facilities are granted either in US dollar or in riel, depending on the liquidity shortfalls forecasted by the applicant banks. The initial period of the facilities ranges from one week to one month, and is intended to help the institutions to overcome a short-term liquidity shortage. The facility may be extended for a new period not exceeding one month, and it cannot be rolled over more than two times. In the event the implementation of the proposed action plan does not result in a durable improvement of the bank's liquidity condition after an extension period of the overdraft facility, the central bank will take appropriate action, as it deems fit, to deal with the problem bank and devise an appropriate resolution.

2.3 Collateral Criteria for Borrowing from Central Bank

As defined in the Law on Organisation and Conduct of the National Bank of Cambodia, the central bank is empowered to grant overdraft facilities to banks against collateral of government securities or government guarantee securities. Banks may also pledge loans as collateral in securing their overdraft facilities. Such loans shall not be adversely classified and meet all the criteria and requirements established in applicable regulations by the central bank. Banks are required to provide a detailed list of the eligible collateral and loans, such as initial amount, debtor, nature of the loan, classification in the bank's books and records, tenor, amortisation schedule, transaction number, ultimate maturity, and collateral pledged to the bank to secure the loan.

Loans and facilities extended to related parties are not eligible as collateral. The central bank may refuse acceptance of collateral on ground of suspicion of close links of loan accounts with related parties as well as close economic or business relationships. The loans and facilities pledged as collateral must be sufficiently diversified. The loans or facilities maturing during the overdraft facility period are not acceptable as collateral. The proposed collateral is to be valued at book value as of the latest date prior to the establishment of the proposed collateral list. The central bank applies a haircut of 40% to the value of the total collateral pledged, which means that the overdraft facility could only be granted up to 60% of the collateral value.

Banks are required to earmark in their books any loans and any other eligible assets pledged as collateral to the central bank in order to secure an overdraft facility. The collateral pledged is to be documented

in accordance with the legal forms and rules applicable in order to safeguard the central bank's interests from any possible joint claim by any collateralised lending counterparty. The central bank has full rights to the collateral pledged and will institute legal action against any bank that knowingly omits disclosure of such restrictions or pre-existing pledges that could prejudice its rights to such collateral.

The central bank will perform a review of the proposed collateral prior to making its final decision on the grant of the overdraft facilities. The central bank will carry out an on-site review of the collateral loan documentation aimed at verifying notably the effective possession of the proposed collateral documents, characteristics of such collateral, absence of adverse classification in the applicant bank's books, account records on performance and delinquency over the past period of time, and conditions under which the loans and assets proposed under the collateral pledge are earmarked and secured to protect the central bank's interests.

Banks are required to comply with the submission of regular report to the central bank on receipt of the overdraft facility until termination of the facility. The reporting requirements are determined taking into account the adverse circumstances affecting the bank's liquidity condition and of the overall risk profile assessment made by the central bank on the bank's overall condition. The frequency of requested reports should be commensurate with the risk assessment. Where necessary, in the event of a serious liquidity concern and a progressively deteriorating condition, the central bank may require a daily report of the day's inflows and outflows as well as the liquidity gap forecasts for the following days.

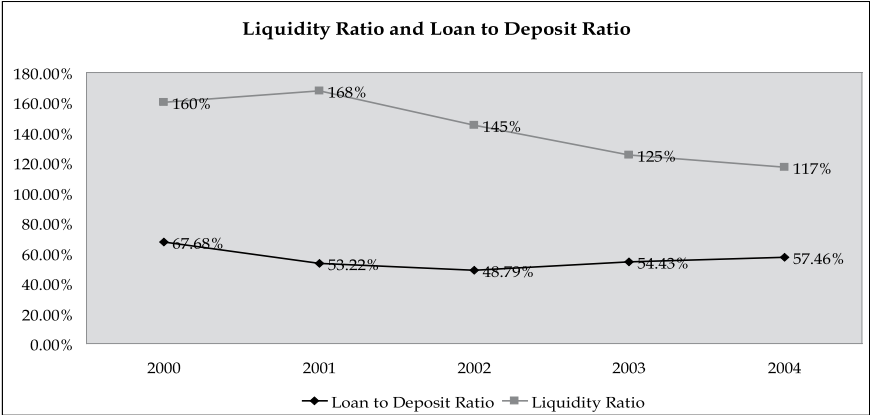
3. Dynamics and Determinants of Liquidity in Cambodia

3.1 Liquidity Profile in the Financial System

Liquidity in the financial system is generally characterised by the movement of liquidity in the banking sector. In the absence of a money and interbank market as well as a capital market, liquidity in the banking sector is mostly in the form of cash and placements with both local and overseas banks. Since the restructuring programme in 2000, when banks were required to increase their minimum capital base to US\$13 million and operate in compliance with the prudential regulations enforced by the supervisory authority, until the onset of the impact of the global crisis on Cambodia in mid-2008, the banking sector was flushed with excess liquidity. As can be seen in Figure 4 below, during the period of 2000 to

2004, the liquidity ratio of banks was more than twice the prudential limit of 50% while the loan-to-deposit ratio averaged less than 55%.

Figure 4
Loan-to-Deposit Ratio



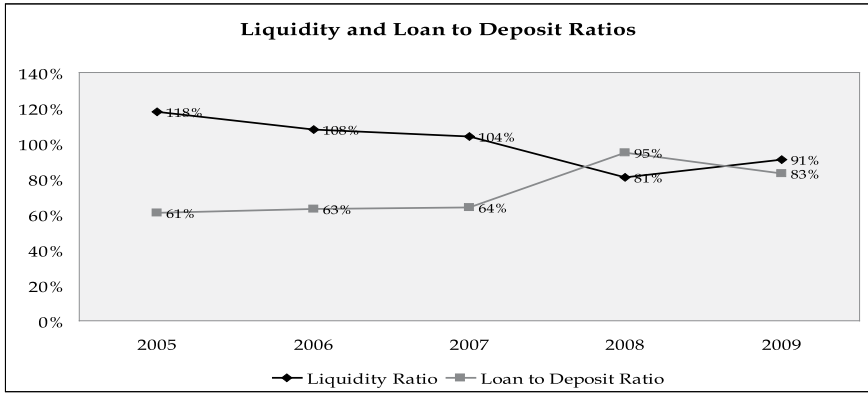
Source: National Bank of Cambodia

Though intermediation in the banking sector was relatively low compared to GDP, a large proportion of funds accumulated was not channeled for investment. This may be explained by the following factors: (1) Banks were concerned about the moral hazard of firms and households not properly using the funds as proposed. Banks did not have complete information of the borrowers to assess their repayment capacity. With the lack of proper accounting practice, banks were not able to use financial statements of borrowers as a basis of assessing the primary source of income for repayment. (2) Bank loans and advances were mostly secured by collateral, which is the basis of credit approval. However, due to the bureaucratic inefficiency and lack of transparency of the property registry office, banks incurred extra overhead cost to verify the authenticity of the collateral. Given the constraints, banks were generally reluctant to lend. (3) The profile of borrowers was not publicly available. The lack of credit information made it impossible for banks to identify customers' banking conduct and their record of borrowing. (4) The banking community, then, did not have in place an adequate risk management system to address and mitigate their credit risk. All these factors operated to restrict the supply of credit for investment.

On the other hand, the demand for credit stagnated during the period possibly due to these reasons: (1) Socially in Cambodian society,

the practice of borrowing does not reflect positively on the borrower. Individual and firms doing business avoid debt financing as much as possible, as it would downgrade their social standing. People prefer doing business with their own capital, minimising on borrowing. (2) The income level of Cambodia was low which did not provide entrepreneurs with much business opportunities. With few business partners, low skills and technology, and faced with the business risk and challenges, people preferred to seek employment in the public sector rather than engage in self-employment running their own businesses. (3) The cost of financing probably explained why demand for borrowing was scarce. The cost of borrowing averaged around 18% per annum, which was high compared to other countries in the region. The high cost of funds generally reflected the high risk characteristic of borrowers, and the returns to banks had to be high enough to compensate for the high cost of operating in the Cambodian environment.

Figure 5
Liquidity Ratio and Loan-to-Deposit Ratio



Source: National Bank of Cambodia

The period from 2005 to mid-2008 was a period of high rapid growth. The loan-to-deposit ratio moved upwards while the liquidity ratio gradually declined. Businesses were flourishing throughout the country and income almost doubling. Funds were channeled into every sector of the economy, largely into the wholesale and retail trades. Cambodians imported substantially ranging from basic to high-end consumption goods, and exported limited commodities, especially textile, agriculture and agro products, and natural resources. The service sector accumulated huge amounts of funds, followed by real estate, construction, and manufacturing. The demand for credit increased as firms felt the need to

leverage and diversify their businesses, and households desired to borrow for consumption rather than save. The availability of funds in the market grew with the entry of new banks as well as through foreign capital inflows. Banks were constrained for the first time during this period in funding sources to accommodate credit expansion. Foreign bank subsidiaries and branches sought funding support from their head office to meet the demand for credit expansion.

Cambodia faced a severe liquidity shortage in the banking sector by mid-2008. Prudential measures were imposed by the central bank, such as the doubling of the reserve requirements to 16% and restriction of credit to high risk sectors especially real estate and construction. In an attempt to combat the growing inflation through reduction of credit expansion, Cambodia experienced a tightening of liquidity in the banking system as well as the entire economy. The reversal of capital flow as foreign investors faced liquidity shortage in their home countries further deepened the problem. Under the impact of global financial crisis, the major sectors of the economy such as textile exports, tourism, construction, and agriculture, were severely affected, causing unemployment to rise and income levels of households to fall.

At this critical juncture, the central bank acknowledged the need to ease liquidity in the market to stimulate investment and support economic growth while creating jobs and income for households. The NBC lowered the reserve requirement and abolished the restriction of credit to the high risk sectors in early 2009. At the same time, it implemented an economic stimulus package along with tax reductions to support the business continuity of firms. Foreign capital returned to Cambodia with the improvement of the economic situation in the region. Firms and entrepreneurs could gradually access credit to normalise their business. Despite the progress achieved, if the global crisis persists for a longer period, the risk remains critical a liquidity shortage may translate into insolvency problem, and vice versa.

3.2 Development of Liquidity Indicators

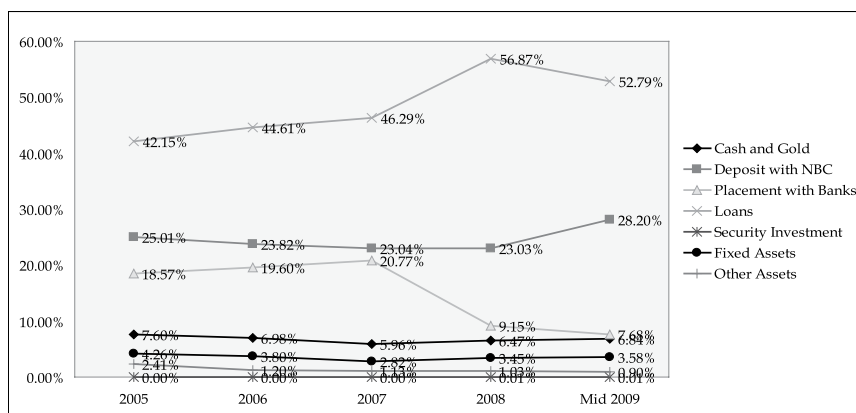
As mentioned earlier, the money and interbank market as well as capital market are non-existent in Cambodia. This paper looks at funding liquidity risk. It does not cover market liquidity risk, which is beyond the scope of this study.

3.2.1 Funding Liquidity Indicators

The liquidity ratio, which is generally expressed as the ratio of liquid assets in relation to weighted customer deposits, is a prominent indicator measuring the liquidity risk of banks in Cambodia. Only cash and placements with banks are qualified as liquid assets specified in the numerator of the ratio, while deposits weighted according to the type of account, i.e. 80% for time deposits, 60% for demand deposits, and 50% for saving deposits, are placed under the denominator. Banks and financial institutions are required to maintain a minimum liquidity ratio of 50%. The loan-to-deposit ratio is also important in measuring the liquidity position of banks. The larger the ratio, the more constrained is the liquidity condition, given that deposits and loans both are major sources and uses of funds in the banking system. There is no prudential requirement imposed with regard to the loan-to-deposit ratio. As can be seen in Figure 5 above, the liquidity ratio dropped from 118% in 2005 to its lowest at 81% by end-2008 and improved to 91% in mid-2009. Despite the decline in the liquidity ratio, it remained substantially above the prudential limit. Similarly, the loan-to-deposit ratio reached its peak in end-2008 and contracted to 83% by mid-2009. These two ratios revealed a common finding that the liquidity condition in the banking system was at its worse in 2008.

Besides these ratios, the breakdown of assets and liabilities also provides some clues on the liquidity condition of banks. The breakdown helps reveal where the assets and liabilities are concentrated. As can be seen in Figure 6, loans in proportion to total assets surged to 57% by end-2008 and then declined to 53% in mid-2009. To support this credit expansion, banks reduced their placements causing pressure on liquid assets. Deposit with the central bank showed an upward trend in the first semester of 2009, particularly due to the rise of customer deposits while credit disbursement was slowing down. Banks, thus, opted for the most practical solution. They increased their placement of funds with the central bank to earn some risk-free interest and maintain reserves for their liquidity need.

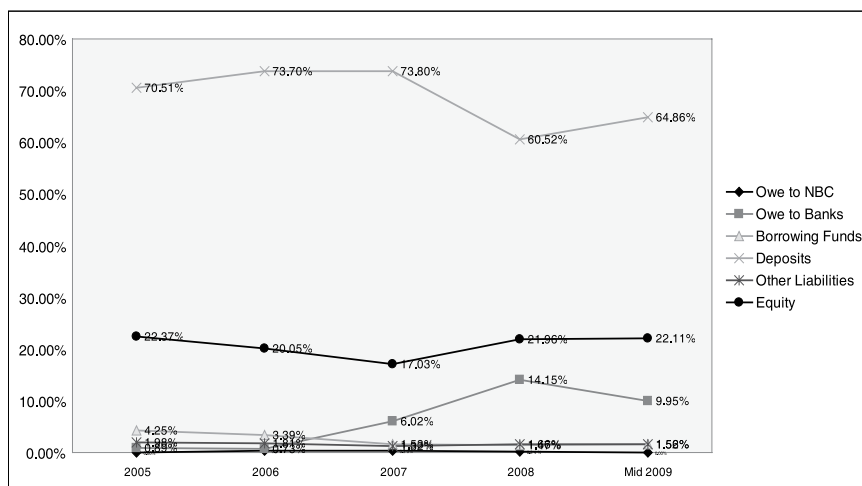
Figure 6
Major Uses of Funds in Proportion to Total Assets



Source: National Bank of Cambodia

On the other hand, it can be seen from Figure 7 that the proportion of deposits to total liabilities and equity declined to its lowest level at 61%, while borrowing from banks rose upward to its highest at 14% by end-2008. This confirmed further that, to support credit expansion, banks not only reduced their placements but also engaged in borrowing from overseas banks, especially from their parent banks. Those borrowing were generally of a short-term nature ranging from three months to one year. Once additional deposits were accumulated, banks started to partially settle with their head office for the borrowed funds. The proportion of equity rose up gradually with the injection of additional capital and capital of new incoming banks.

Figure 7
Major Sources of Funds in Proportion to Total Liabilities and Equity



Source: National Bank of Cambodia

In addition, the maturity gap of assets and liabilities is also helpful in gauging the liquidity condition of banks. However, this indicator was only adopted recently to better assess the liquidity risk of banks in the sense that it provides information on the mismatch of assets and liabilities within a particular time horizon. The maturity of assets and liabilities are classified into eight time horizons ranging from less than one month, from one to three months, until more than ten years. According to the Figure 8 below, the maturity gap with less than one month was largely negative in June 2008, the time when Cambodia hard hit by the global crisis. The gap remained negative until the end of 2008. However, it improved substantially in March and June 2009.

Figure 8
Maturity Gap of Assets and Liabilities (US\$ million)

Maturity Gap	03/2008	06/2008	09/2008	12/2008	03/2009	06/2009
Up to 1 month	2.51%	-6.59%	-7.70%	-4.10%	0.20%	6.01%
> 1 – 3 months	-10.59%	-2.83%	-7.02%	-6.84%	9.56%	-9.52%
> 3 – 6 months	-2.09%	-3.93%	-1.50%	-2.14%	11.06%	-1.09%
> 6 – 12 months	-4.43%	6.09%	1.50%	-0.30%	2.18%	-0.84%
> 1 – 2 years	9.57%	1.14%	4.98%	6.73%	2.34%	1.54%
> 2 – 5 years	9.89%	10.02%	9.71%	8.90%	7.82%	9.77%
> 5 – 10 years	2.84%	3.07%	2.93%	3.12%	5.49%	2.84%
> 10 years	-7.71%	-6.97%	-2.91%	-5.36%	-38.65%	-8.72%

Source: National Bank of Cambodia

Besides these indicators, the statistics on the number of depositors and the amount of classified deposits were also used to measure liquidity position of banks. These figures identified the likeliness that banks may face liquidity shortage if large deposits are drawn down. As can be seen in Figure 9 and Figure 10, more than 80% of depositors deposited less than US\$500 while around 3% of depositors maintained more than 83% of total deposits in banks. This could simply mean that the banking system is highly susceptible to large deposit withdrawals. Any run on banks from these depositors will put severe pressure on liquidity and could bring banks to collapse.

Figure 9
Values of Deposits According to Class of Deposits (US\$ million)

Limit	01/2009	02/2009	03/2009	04/2009	05/2009	06/2009
> 20,000	83.78%	80.80%	83.24%	83.12%	83.27%	83.07%
≤ 20,000	5.60%	7.87%	5.57%	5.69%	5.71%	5.84%
≤ 10,000	3.95%	4.38%	4.08%	4.07%	4.15%	4.16%
≤ 5,000	1.93%	2.03%	2.03%	2.02%	2.00%	1.98%
≤ 3,000	2.71%	2.75%	2.75%	2.69%	2.70%	2.65%
≤ 1,000	0.79%	0.84%	0.84%	0.79%	0.84%	0.81%
≤ 500	1.13%	1.20%	1.20%	1.15%	1.12%	1.09%
Others	-	-	-	-	-	-
Total	100%	100%	100%	100%	100%	100%

Source: National Bank of Cambodia

Figure 10
Number of Deposits According to Class of Deposits

Limit	01/2009	02/2009	03/2009	04/2009	05/2009	06/2009
> 20,000	2.09%	2.04%	2.56%	2.02%	2.02%	3.02%
≤ 20,000	1.41%	1.43%	1.39%	1.41%	1.44%	1.45%
≤ 10,000	1.98%	2.03%	1.95%	1.97%	2.01%	2.02%
≤ 5,000	1.79%	1.77%	1.79%	1.83%	1.84%	1.83%
≤ 3,000	5.02%	5.06%	5.00%	5.05%	4.98%	4.94%
≤ 1,000	4.29%	4.43%	4.25%	4.25%	4.50%	4.40%
≤ 500	83.43%	83.24%	83.06%	83.48%	83.22%	82.34%
Others	-	-	-	-	-	-
Total	100%	100%	100%	100%	100%	100%

Source: National Bank of Cambodia

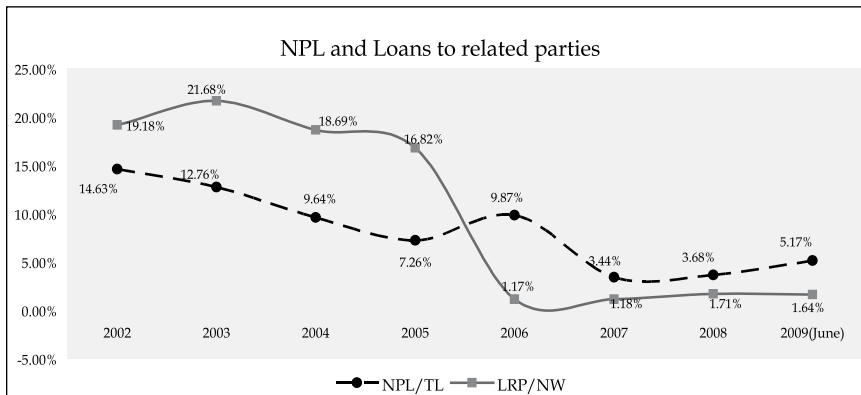
3.2.2 Qualitative Measures

Other qualitative measures are also taken into account for consideration of the liquidity condition. Generally, these measures include banks' overall financial condition, off- balance sheet commitments, and public confidence in banks. However, credit rating of banks is not applicable for liquidity assessment because of the absence of credit rating agencies and it is also not compulsory for banks to be rated in Cambodia.

The assessment on banks' overall financial condition also provides some insights for understanding liquidity condition of banks. Generally, bank liquidity and solvency are linked. Severe liquidity problem can trigger insolvency problem, and vice versa. This study focuses on the liquidity problem of banks which are otherwise solvent. While solvency position of banks can be studied using various approaches, the discussion here is focused only on the profitability and asset quality of banks.

Poor asset quality affects the liquidity of banks in the sense that if the expected cash flow from loan repayment are not received on time, banks would not be able to relend or meet their obligations at the projected date. Thus, banks may need to find other funding sources for replacement. This is something that could trigger a serious liquidity problem. As in the case of Cambodia, non-performing loans declined to its lowest level at 3.44% by end-2008 and then gradually rose to 5.17% in June 2009. The global crisis caused an economic slowdown in the country and impacted on non-performing loans causing to surge slightly. The level of non-performing loans was still considered satisfactory and the risk of poor asset quality triggering a liquidity problem at that time was considered minimal. However, the prolonged impact of the global crisis may severely deteriorate banks' asset quality and the potential danger of rising non-performing loans could squeeze banks' funding sources and give rise to a liquidity shortage.

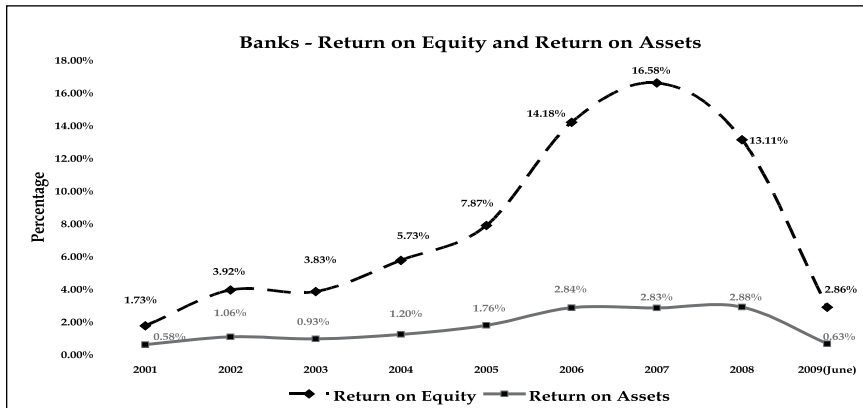
Figure 11
Ratio of Non-performing Loans and Loans to Related Parties



Source: National Bank of Cambodia

Similarly, banks' profitability affects liquidity. Poor performing banks are likely to have less funds available for further investment or for meeting obligations. Losses, if severe, will erode the capital base of banks. The banks may fall into a liquidity problem requiring fund injections. Poor bank performance, which is mostly caused by poor asset quality, high transaction cost, intense competition, and narrow interest margin, ultimately jeopardizes banks' reputation. Banks that are solvent are able to borrow at lower cost, whereas less solvent banks incur higher cost for borrowing. This is referred to as the risk of credit spread which affects banks' liquidity. According to Figure 12, banks' profitability indicators show that bank earnings declined significantly from 2007 to mid-2009, due particularly to the slowdown of credit expansion and the rising of non-performing loans. However, earnings remained positive during this period and there was no serious pressure on bank solvency. Given that non-performing loans are expected to continue deteriorating, most banks may operate with losses, eroding their capital position. Funds are less likely to be available when banks make losses, and coupled with the risk of the credit spread, the impact on liquidity may be significant.

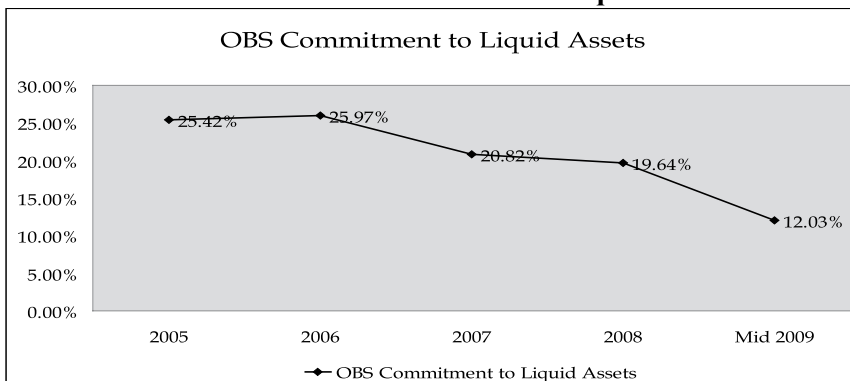
Figure 12
Banks' Profitability Ratios



Source: National Bank of Cambodia

The commitment of banks with regard to the off-balance sheet items also proves to be important in assessing the liquidity condition of banks since it partly indicates potential fund outflows. In the event that banks do not have sufficient funds to meet such commitments, they may encounter a liquidity problem. Figure 13 shows that the off-balance sheet commitments in proportion to liquid assets declined overtime and it accounted for 12% by mid-2009. Such a reduction was much consistent with the fall in the rate of credit growth as well as the slowdown of economic activities. With this low ratio, banks were considered to have sufficient funds to meet their obligation.

Figure 13
Off-balance Sheet Commitment to Liquid Assets



Source: National Bank of Cambodia

Finally, assessment on bank's liquidity condition must also take into account reputation risk as public confidence in the banking system is crucial to avoid bank-runs. The lack of public confidence was a major concern. It was attributed mainly to this issue why the financial deepening as well as intermediation in the banking sector remained low as compared to GDP. The supervisory authority and the banking community at large have been collaborating to enhance public confidence in banks. Some progress had been achieved over the past few years after the restructuring programme in 2000. The safety and soundness of the banking sector were largely better than ever before. However, with the outbreak of the global crisis, there was speculation that most of the banks are in a very vulnerable position. The media tended to exaggerate the problem. However, the authority had anticipated the problem and was well prepared to deal with it. The policies adopted by authority to minimise the impact of the global crisis, such as easing liquidity constraint and enhancing the safety and soundness of banks through increasing their capital base, governance, and risk management process, proved to be effective to some extent, and the banks were able to withstand the most stressful period particularly in late-2008. Despite this optimism, the Cambodian banking system remains vulnerable to sudden changes in the global economic condition which could easily give rise to negative public sentiment.

3.3 Factors Affecting Liquidity Risk in Cambodia

After reviewing liquidity profile and indicators for assessing liquidity condition, we may reach some conclusions regarding the factors affecting liquidity risk in Cambodia. These factors can be categorised as macro- and micro-factors. The macro surveillance of liquidity condition in the banking system provides that monetary policy, regulations of the supervisory authority, and potential capital reversal are the major factors affecting liquidity risk, while the micro assessment pinpoints that banks' financial condition, especially potential insolvency problem due to substantial rising of non-performing loans and severe losses, and lack of public confidence in individual banks, are the significant factors to impact on liquidity condition.

Of the macro factors, monetary policy adopted by the central bank is most likely to affect the liquidity position of banks. As occurred in mid-2008, the central bank raised the reserve requirement to 16% in order to combat inflation. However, this policy led to severe liquidity tightening in banks. Currently, inflation is relatively stable which does not require drastic policy response. However, given that the CPI basket consists

largely of imported commodities from neighboring countries and the riel, the national currency, is depreciating against the currencies of Cambodia's major trading partners, and coupled with the recent surge in the world oil price, the tendency is for inflation to rise again. Any policy actions in response to this will cause the recurrence of a liquidity crunch.

Prudential regulations imposed by the supervisory authority also had some major impact on liquidity in the banking sector. The central bank tripled the minimum capital requirement to US\$38 million from US\$13 million and adopted a new ruling on governance where banks' shareholders are required to meet some minimum qualification criteria in an attempt to enhance banks' viability. However, some small banks had difficulty meeting the criteria. In addition, the central bank also introduced more stringent liquidity measures which required banks to establish prudent liquidity management policy, conduct stress-test scenarios, and formulate liquidity contingency plans. All these measures impacted the environment, making it less conducive for liquidity demand.

Capital reversal was largely explained mounting liquidity risk in the banking sector during mid-2008 and early-2009. In the absence of money market and capital market, a large portion of the capital inflows went into the banking sector accumulating substantial shares of foreign capital. With the outbreak of the global financial crisis, foreign capital flowed out from Cambodia causing a severe liquidity shortage in the country. The situation has improved recently with the return of foreign capital. However, uncertainty regarding world economic recovery makes the inflow of foreign capital into Cambodia unsustainable. This may have a significant impact on liquidity in the banking sector.

Of the micro factors, bank insolvency is one of the major factors that has a bearing on liquidity in the banking system. Bank insolvency is normally caused by poor asset quality, severe losses, management incompetence in coping with banking risk, and poor business strategy in an intensely competitive environment. In the event that the impact of the global crisis on the Cambodian economy persists for a longer period, firms and households are expected to go through a most stressful period. Currently, non-performing loans in the banking sector are on the rise and are expected to climb significantly. The expansion of non-performing loans may lead to refinancing problem and it may cause the profitability of banks to plunge. While the banks may require additional funds to sustain their solvency, obtaining additional fund support during such stress period will be extremely difficult for the banks. If this scenario materialises, it will deepen the liquidity problem in the banking system.

4. Liquidity Risk Management in Banks

4.1 Past Development

As discussed earlier, there was high excess liquidity in the banking system long before the global crisis hit the Cambodian economy in mid-2008. Before the crisis, the management of liquidity by banks was conventional. Banks held substantial cash and placements which were the most highly liquid assets in the Cambodian banking system. Cash played a significant role in liquidity management of banks. What banks did was to maintain cash level sufficient to meet the cash demands of their customers. Based on previous performance, banks were able to estimate the daily, weekly, and monthly demand for cash. Cash inflows and outflows within these periods were used to construct the trend, project the cash demand cycle and determine the reserved cash level. Generally, banks hold their cash level at an average of 7% of total assets. This level of cash holding was high compared to banks in the neighboring countries of the region. The reason is due to the fact that Cambodia is a cash-based economy.

Besides holding cash, banks maintained placements with the central bank and with other banks, both local and overseas, as part of their liquidity management process. Such placements consisted mainly of correspondent accounts and certificate of deposit accounts. Correspondent accounts are generally used for settlement purposes, especially inward and outward remittance and trade financing activities. Certificate of deposit is a form of investment for banks to generate some profit. This investment is of benefit to the banks as it is much less riskier than loans, and could be liquidated quickly to meet an extraordinary need for cash. In a manner similar to the management of cash, banks observed the previous trend and cycle to determine what proportion of their funds should be placed under correspondent accounts and under certificate of deposit accounts, the latter bearing interest but with some maturity constraint.

In addition to this, liquidity management in banks was driven by the lack of liquid financial instruments and the prudential regulations of the supervisory authority. As indicated earlier, loan disbursements to total deposits was less than 55% between 2000 and 2004, and the ratio was around 65% from 2005 to 2008. With the lack of liquid financial instruments in the country, the rest of the deposits were largely held in the form of placements with banks, apart from the cash holdings required. Investment on foreign financial instruments was not an option for banks since prudential regulation restricted banks from using local source of

funds in overseas markets. In line with this, banks are required to maintain a liquidity ratio of above 50% at all times, and this ratio is the norm used as a benchmark for liquidity management.

The liquidity management practices of banks before the global crisis was characterised by several common weaknesses in their internal governance. Generally, banks were without a liquidity management policy. The absence of assets and liabilities management committee often troubled banks in the assessment and management of liquidity risks. The pricing, cost of funds and market risk control rested in the hands of the treasury department, but most of the time the treasury function performed poorly. Liquidity contingency plan was not widely used in banks to identify the immediate sources of funding support. This was the case since banks did not perceive the need to have such complex liquidity management framework once they had high liquidity in hand and were only engaged in such traditional banking activities, like collection of deposits and extension of loans.

The scope of liquidity management practice before the global crisis varied across banks. It cannot be simply generalised that foreign banks had a better liquidity management process than local banks. This question rested on the management capacity of the banks. Some local banks with good management expertise had proved to have high standard of liquidity management on par with the world-class foreign banks operating in Cambodia. On the other hand, a number of foreign banks seemed to have poor practices like the other local banks. Foreign banks and local banks differ in their setup with regard to liquidity management. Foreign banks relied heavily on liquidity support from their head office whereas local banks seek support from the central bank.

4.2 Current Practices

With the looming threat of the global crisis to Cambodian banking sector, liquidity management framework in banks acquired new impetus. Banks were more focused on controlling liquidity risk in order to withstand this stress condition. The supervisory authority at the same time pushed banks to adopt a more stringent liquidity management process. As has been long the traditional practice, banks still concentrated in maintaining sufficient liquid assets in the form of cash and banks' placement to meet the projected demand of funds from their customers. The financial projections to determine the level of reserve funds to hold was still mainly based on the demand cycle, but done in a more prudent manner. Since credit expansion

was speeded up rapidly shortly before 2008, there was room for banks to accommodate the demand for credit and reduce their liquid assets over time.

In response to mounting liquidity pressure in 2008, banks developed more tools and tighter liquidity management process. As part of the prudential requirements, daily liquidity ratio monitoring was adopted for banks to review their liquidity condition in a timely manner. Credit and deposit growth projections were also implemented to ensure stable flow of funds. Banks' interest rate for deposits increased from an average of 4% per annum by end-2005 to around 7% per annum in 2008 to attract additional deposits. It was fortunate that the competition for deposits among banks during the period did not create a liquidity shortage as higher interest rate attracted foreign capital as well as additional saving in banks.

Another important tool for monitoring liquidity is the application of maturity mismatch. Most of the banks attempted to maintain a positive gap though the prudential regulation did not specify any requirements for the gap. The mismatch of maturity between assets and liabilities generally occurred when short-term source of funds are used for long-term financing. To minimise the impact of the mismatch, banks were seeking long-term funding sources. However, long-term funds were not easily available in domestic market. Banks, therefore, largely depended on foreign capital.

Apart from liquidity ratio and the maturity gap, banks took into account potential non-performing loans, off-balance sheet commitments, and potential withdrawal of large deposits to determine whether the impact of these factors on liquidity was material. Banks reviewed non-performing loans to identify if their projected cash inflows were short by problem loans, rendering them unable to meet their projected cash outflows. Off-balance sheet commitments were also considered in determining potential cash outflow from banks. These factors could deepen the liquidity condition of banks. While the calculation of liquidity ratio and maturity gap required by the supervisory authority ignored these effects, some banks attempted to incorporate the effect of these factors in their internal procedure for liquidity management, such as adjusted liquidity ratio and adjusted maturity gap. To contain immediate cash shortfalls, banks established a norm for large withdrawals. Prior notice up to 72 hours was required for the withdrawal of large deposits. This provided some breathing space for banks to deal with the problem in the event of any cash shortfall.

In addition, some large banks employed stress-test scenarios to project the adverse impact of market conditions on their liquidity position. As a minimum, the stress test projected the magnitude of deposit outflows that could bring down the liquidity ratio below the prudential limit of 50%. The test then incorporated scenarios of credit default and obligation to meet off-balance sheet commitments. Generally, credit defaults were projected based on credits to the highly vulnerable sectors, such as garment, real estate and construction, and tourism. Besides these, the test could employ the worst-case scenario with extreme deterioration in solvency condition, or the contraction of capital from home country in the case of foreign bank subsidiaries and branches.

As the banking sector faced increased pressure in liquidity, banks acknowledged the need to improve their internal governance procedure for managing liquidity. Many small banks started introducing the practice of assets and liabilities management committee while the large banks made further improvement in their practices. Such a committee was essential in the sense that it addressed policies and procedures for maintaining adequate liquidity and controlling interest rate and maturity risk. It was also necessary for optimising the interest earnings of banks. At the same time, banks enhanced the efficiency of their treasury departments to implement the policies and procedures established by the assets and liabilities management committee. Also other key risk-management areas were strengthened, especially credit risk and strategy risk. A new set of rules was strictly enforced by the supervisory authority on banks concerning the recognition of non-performing assets.

Annual liquidity contingency plan was also established as part of the toolkit for the improvement of the liquidity management process. As a minimum, the plan identified the funding sources in the event of an immediate need. Also the back-up funding sources needed to be specified once the primary funding sources were not available. The amount of funds available from influential shareholders, any shareholders, prospected shareholders, or any available sources could be addressed in the plan. In addition, it included an analysis of the cost of funds for immediate liquidity need. In particular it specified the cost for which banks are willing to pay or have to pay for obtaining such liquidity. The average term of contingency funds include that of matching the average term in banks' current liquidity position. Generally, the contingency plan of local banks relied heavily on shareholders' funds while foreign banks' subsidiaries and branches had their fund support from their head offices. Due to the absence of a money and interbank market and lack of liquid financial instruments, banks are constrained in setting up their back-up funding sources.

Currently, there is initiative to introduce liquid financial instruments to facilitate liquidity management in banks. The legal and regulatory framework for money and inter-bank market, government securities, and capital market is almost in place. Banks are discussing among others to process these arrangements. Some banks have reached agreement in adopting repurchase agreement and commercial paper instruments. It is a positive first step towards the development of the interbank market offering more tools for managing their liquidity. In the past, banks were reluctant to lend to one and another. With established arrangement and a more stable financial condition, banks today engage in more of such transactions and have shown readiness to cooperate in the banking community. This is a positive sign towards the establishment of the interbank market. Facing the current economic slowdown and continuing pressure of liquidity risk, banks coordinate with their counterparts for liquidity assistance whenever needed.

5. Lessons Learned

5.1 Trend in Liquidity Risk Management

Liquidity management practices in banks have changed significantly after the impact of the global crisis on Cambodia. It is well worth repeating that, until late-2006, banks did not put in place mechanisms for proper liquidity management. What they did was to maintain highly liquid assets and to meet the regulation of the supervisory authority. Gradually, banks perceived the need to have a proper risk management framework as they faced mounting liquidity pressure due to rapid credit expansion. Additional funds were required to accommodate credit expansion as well as meet self-sufficiency for liquidity with the absence of a local interbank and money market. Obtaining additional deposits and borrowing from overseas were only the two options available for banks to meet the need for funds. Banks saw the role of assets and liabilities management as crucial to their operation as well as to managing liquidity risk. At the same time, banks put in place some additional tools, such as maturity-gap analysis. A few large banks even introduced sophisticated techniques for conducting stress test to evaluate their liquidity position.

By late-2008 and early-2009, at the height of the impact of the global crisis, banks produced or revised their liquidity contingency plan to withstand their worse-case scenarios. As a minimum, the banks' liquidity contingency plan consisted of capital injections from existing and potential shareholders, borrowings from head offices or motherhouses, borrowings

from regional financial institutions, and securing of credit facilities from the central bank. At the same time, some banks reached agreement to assist one and another in the event of an emergency liquidity need. The repurchase agreement is the tool adopted between banks as a form of liquidity assistance.

On the whole, liquidity risk management framework in banks has developed remarkably in recent years. Banks generally have introduced more tools and techniques to improve their liquidity risk management framework. The small banks appear to lack behind the large banks in upgrading their liquidity management framework. However, the risk to their system is relatively low as compared to the large banks.

5.2 Role of Liquidity Risk in Triggering Financial Crisis

Cambodia is not isolated from the rest of the world. Even though the banking system in Cambodia is very traditional engaging mostly in deposit-taking and lending activities, nevertheless, liquidity risk is considered one of the most important factors for banks to fail. Generally, for the economy as a whole, the shortage of liquidity is likely to result in the shortage of funds for investment. This would lead to lower employment and reduction of income for households, and this trend was observed in Cambodia in late-2008 and early-2009. A study conducted by the Cambodia Institute for Development Study (Kang Chandararoth et al., 2009) estimated that the impact of the global crisis reduced Cambodia's potential output by US\$282 million in 2008 and US\$677 million in 2009, while unemployment rose substantially in the major sectors of the economy. Estimates of the garment and textile sectors indicated approximately 27,000 jobs were lost. The estimated job losses in the construction sector were around 15,000. The tourism sector also suffered massive layoffs.

The shortage of liquidity in the financial sector caused banks to have less funds to meet their obligation. With the adoption of prudential measures in response to rapid credit growth and slowdown of capital inflow due to the global recession, Cambodia experienced a liquidity freeze in the banking sector in late 2008 which poised a huge threat to the entire economy. Banks had difficulty meeting the demand of depositors as well as coping with the flight of capital. Banks drew down their liquid assets, with some banks seeking liquidity support from the central bank. Considering the possibility of bank-runs which could damage public confidence in the banking system and the possible spread of the contagion effect across the banking industry, the central bank took swift action to

remedy the situation through relaxation of the prudential measures to ease liquidity flow in the banking sector. Fortunately for Cambodia, it saw the return of capital with the gradual improvement of the global and regional economy, which contributed in sustaining the liquidity situation.

5.3 Development of Liquidity Situation

The liquidity risk pressure has been easing in recent times. Public confidence remains strong in the banking system, and banks continue to absorb new deposits and foreign capital inflows. The central bank and the banking community work together in close collaboration to maintain public confidence. Banks show progress in developing their liquidity management framework, and are mostly compliant with the prudential regulations on liquidity. The central bank continues to monitor the liquidity situation closely. Tools and techniques for liquidity assessment both at micro- and macro-levels are being updated, and new additional tools for liquidity management are being put in place. The institutional and legal framework is being improved upon to allow more room for the banks to introduce new products, services, and financial instruments, and for them to better manage their liquidity position.

5.4 Future Prospect

In the near term, the money and interbank market and capital market will come on stream and be fully operational. They will provide additional framework for liquidity management for the banking community as well as for the central bank. Various financial instruments such as repurchase agreements, commercial papers, government bills, and corporate debt security, will be readily available in the market. This will provide flexibility for banks to match their financial assets and financial liabilities, therefore improving the liquidity management framework in these institutions. These financial instruments will also enable banks to access new sources of funding besides customer deposits and borrowings.

However, with new financial instruments coming on stream, banks will be more exposed to market risk. In the past, exchange-rate risk and interest-rate risk were the predominant risks in the banking sector. The introduction of these instruments will subject the banks to another risk – the price risk. Due to the lack of experience in managing these instruments, banks may face potential losses dealing in these financial instruments. While the price risk associated with the financial instruments is highly correlated with liquidity, banks will need to strengthen their framework for managing market liquidity risk.

6. Conclusion

The financial system in Cambodia is at a rudimentary stage of development and is dominated by the banking sector. Banks engage in the traditional form of banking business, notably deposit collection, credit disbursement, and payment settlement. With the absence of a money and capital market, banks have to cope with funding liquidity risk. Since the restructuring programme in 2000 until late-2006, banks in Cambodia were in excess liquidity. During this time, the liquidity management framework of banks was extremely simple as banks only acted to comply with prudential regulation on liquidity and held sufficient cash reserves to meet the demand of their customers.

After 2006, banks gradually encountered a liquidity squeeze due to rapid credit expansion and insufficient deposit collection to accommodate such expansion. Lacking the setup of an ALCO committee within bank, or with a poorly functioning ALCO, banks projected on the need of funding and the cost to acquire it, and focused on achieving a positive maturity gap. Banks felt the compelling need to enhance their liquidity management framework for the first time. Matching the sources and uses of funds to create a positive gap was a difficult challenge as the sources of funds were typically short term in nature while the uses of funds were long term. Due to the constraint in obtaining long-term financing in the domestic market, some banks resorted to long-term overseas funding or borrowing from their parent banks, while other banks left the mismatch maturity exposure in their books.

By mid-2008, the banking sector faced liquidity crunch due to the reduction of deposits and capital outflows. Most of the banks encountered liquidity shortage and even breached the prudential regulation. The supervisory authority moved swiftly to relax the prudential measures which contributed to the liquidity tightening. In addition, the central bank made available its credit facilities to support the troubled institutions.

The banking community acknowledged the need to further upgrade their liquidity management framework. Banks employed stress test scenarios to assess the impact on their liquidity position and improved their governance relating to liquidity, such as the establishment of assets and liabilities framework, liquidity management framework, and the formulation of liquidity contingency plan. These efforts contributed in helping banks to tide through the most stressful period in late-2008. Public confidence in the banking system was restored to some extent. Customer

deposits and capital inflows returned to the banking sector while recession in the region gradually receded.

Currently, the liquidity condition in the banking industry is stronger than ever, particularly with regard to the adoption of better liquidity risk management framework. Banks possess more tools and techniques in managing their liquidity risk and can depend on the support of the central bank in the event of liquidity need contingency. In the near future, the introduction of a money and interbank market will provide banks with additional flexible tools to manage liquidity risk. However, banks will have some exposure to additional risk, such as price risk and market liquidity risk.

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LIQUIDITY MEASUREMENT AND MANAGEMENT IN KOREA

by Myeong-suk Kim¹

1. Introduction

The recent crisis in the global financial markets has shown the importance of liquidity risk. The crisis brought about a credit crunch due to the liquidity risk of financial companies and the total financial system, and posed a threat to global financial system stability.

Liquidity refers to the capacity of financial companies to obtain the necessary funds to increase their assets and repay their debts due. Liquidity risk is divided into funding liquidity risk and market liquidity risk. Funding liquidity risk refers to the risk of financial companies being unable to repay present and future liabilities. Market liquidity risk refers to the risk of financial companies suffering losses during the process of converting assets into money, owing to decreases in asset market prices due to shortages of trading volume and market collapse.

The linkage between funding liquidity and market liquidity may lead to a vicious liquidity cycle. As asset prices fall, financial institutions that borrow to acquire assets face funding liquidity problems, and some of them will have to sell assets to resolve their funding problems. If asset markets are relatively illiquid, however, they may be forced to sell at low prices. That could cause more losses, which will in turn exacerbate the funding problems. In extreme cases, a vicious cycle between the two may be generated.

Central banks have a strong interest in liquidity in terms of the efficient implementation of monetary policy operations, as well as the stability of the financial markets and institutions.

2. Overview of Financial System and Commercial Banking Industry in Korea

The foundation of the modern financial system in Korea was laid during early the 1950s when the central and commercial banking systems

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were established with enactment of the Bank of Korea Act and the Banking Act. Since then, the Korean government has introduced various types of financial industries, including the securities and insurance industries. As a result, Korea has a well diversified financial system to meet the changes in financial service demand of the economic participants resulting from enhanced industry structure, increasing incomes, and so on.

The financial institutions in Korea may be divided into the central bank, which is the Bank of Korea (BOK), banking institutions, and non-banking institutions, including merchant banking corporations, mutual savings banks, credit institutions, insurance institutions, securities-related companies, etc.

The growth of the capital markets in Korea has been substantial. As a result of government efforts, rapid economic growth and the opening of the stock market, their role of mobilising funds has continued to strengthen.

2.1 Share of Banking Sector vs. Capital Market (Bond and Equity Markets)

Commercial and specialised banks are the most influential players in the financial system of Korea, considering the fact that the total assets of the banking sector overwhelm that of other non-banking institutions. As of end-September 2009, their total assets amounted to 2,170.2 trillion won, 56.8% of the total assets of all financial institutions.

Insurance is the second largest financial sector in Korea. However, the uses of insurance companies' assets are severely restricted to protect policyholders, and their influence is relatively limited.

Figure 1
Total Assets in Korea, by Financial Sector

(Period end, trillion won, %)

	2006		2007		2008		2009.9	
	amount	%	amount	%	amount	%	amount	%
Commercial & Specialized Banks ¹⁾	1,510.0	56.5	1,725.5	55.6	2,133.6	59.0	2,170.2	56.8
Merchant Banking Institutions	1.2	0.0	1.8	0.1	2.5	0.1	3.9	0.1
Mutual Savings Banks	50.8	1.9	58.0	1.9	69.2	1.9	79.2	2.1
Credit Institutions	246.5	9.2	251.1	8.1	269.0	7.4	301.0	7.9
Insurance Companies	349.2	13.1	395.3	12.7	424.0	11.7	467.8	12.2
Securities-related Companies	109.0	4.1	140.9	4.5	160.2	4.4	207.6	5.4
Credit-Specialized Financial Companies	65.5	2.5	86.0	2.8	98.9	2.7	95.5	2.5
Others	342.0	12.8	446.9	14.4	457.1	12.6	496.6	13.0
Total	2,674.1	100.0	3,105.6	100.0	3,614.6	100.0	3,821.7	100.0

Note: 1) Covers accounts and trust accounts

2) Covers mutual funds, postal saving and venture capital companies, etc.

Source: Bank of Korea

In the capital market consisting of the bond and stock markets, the bond market accounted for around 70% of the outstanding value of the capital market as of end-September 2009. In the bond market, financial debentures show the largest outstanding amount and government bonds the second largest one. Stock market assets have shown large fluctuations in accordance with the stock price level. At the end of 2008, notably the share of the stock market fell to the mid-20% level, due to outflows of foreign investment induced by the global financial crisis.

Figure 2
Outstanding Amount of Capital Market in Korea

(Period end, Trillion won, %)

	2006		2007		2008		2009.9	
	amount	%	amount	%	amount	%	amount	%
Bonds	1,397.4	66.5	1,614.6	62.9	1,674.6	74.4	1,867.3	68.2
(Government Bonds)	224.3	10.7	240.4	9.4	272.3	12.1	311.1	11.4
(Financial Debentures)	393.3	18.7	430.1	16.8	463.9	20.6	489.8	17.9
(MSBs) ¹⁾	168.8	8.0	153.9	6.0	129.6	5.8	157.8	5.8
(Corporate Bonds)	212.2	10.1	201.9	7.9	231.9	10.3	289.1	10.6
Stocks ²⁾	704.6	33.5	952.0	37.1	576.9	25.6	872.5	31.8
Total (A+B)	2,102.0	100.0	2,566.6	100.0	2,251.5	100.0	2,739.8	100.0

Note: 1) Monetary Stabilisation Bonds issued by the Bank of Korea (excluding those with maturities less than 1 year)

2) Total market value (based on listed companies)

Source: Bank of Korea

2.2 Characteristics of Banking Sector

In Korea, the banking sector consists of commercial banks and specialised banks. As of end-September 2009, there were 13 commercial banks, five specialised banks and 39 foreign bank branches.

Commercial banks have adopted the branch banking system. They can be divided into nation-wide commercial banks and local banks, depending upon their areas of operations. In terms of the scope of their operations, however, there is no difference between nation-wide commercial banks and local banks.

A nation-wide commercial bank is a commercial bank which operates nation-wide. As of end-September of 2009, the average number of branches of a nation-wide commercial bank was about 600. This was almost five times the average number of branches of a local bank. A local bank is a commercial bank which does not operate nation-wide but operates with a province-wide network. Local banks were founded for the purposes of decentralisation of the banking business and promoting balanced growth among regions. As of end- September 2009, the average total asset volume of nation-wide commercial banks was 150 trillion won, more than eight times that of the local banks.

Foreign bank branches carry on their businesses under almost identical conditions to Korean banks nowadays, as preferential treatment has been reduced and discriminatory business regulations lightened.

The non-banking sector consists of merchant banking corporations, mutual savings banks, credit institutions, insurance institutions, securities-related companies, etc. Insurance institutions comprise the largest non-banking industry. Recently, the market share of mutual funds has increased rapidly due to the increase in stock prices and low interest rates on bank deposits.

2.3 Nature of Bank and Non-bank Businesses

Nation-wide commercial banks held total assets amounting to about 1,053 trillion won as of end-September 2009, which was 90.8% of the total assets of commercial banks.

Their principal sources of funds are deposits in domestic currency. At the end of September 2009, deposits and debentures issued in won

accounted for 51.8% and 11.7%, of their funding sources, respectively. As for their uses of funds, nation-wide commercial banks operate the largest proportion of their funds, 29.3%, as household loans. Their shares of loans to corporations and securities in total assets were 27.6% and 16.4%, respectively.

The financial structures of local banks are largely similar to those of nation-wide commercial banks, but their reliance on domestic currency deposits and loans to corporations is higher. At the end of September 2009, deposits in domestic currency accounted for 53.2% of their total sources, while the share of loans to corporations in their total assets was 42.3%.

Foreign bank branches' most important source of funds, typically debt in foreign currency, which as of end-September 2009 represented 53.1% of their total funding sources, followed by inter-office accounts (18.4%), while their deposits in domestic currency constituted only 2.2%. As for their uses of funds, derivatives investment accounted for the largest proportion, at 30.9%. Securities investment accounted for 22.3%, while loans to households and loans to corporations represented 10.7% and 10.5%, respectively.

In Korea, specialised banks share the following main characteristics. First, they were established to provide funds to particular sectors whose access to funds through commercial banks was insufficient due to limited availability or their low profitability. With subsequent changes in the financial environment, however, specialised banks have expanded their businesses into commercial banking areas, although the shares of their funds allocated to the sectors they originated to serve is still relatively high. Most specialised banks now have, by and large, the same patterns of business as commercial banks.

Second, specialised banks rely heavily on deposits from the public for their sources of funds in addition to the issuance of debentures and borrowing from the government. Therefore, they compete with commercial banks in acquiring deposits.

Figure 3
Sources and Uses of Funds of Banking Sector¹

(as of end-September 2009, trillion won, %)

	Nationwide Commercial banks		Local banks		Specialized banks		Foreign Banks branches	
	amount	%	amount	%	amount	%	amount	%
<SOURCES>								
Deposits ²⁾	544.6	51.7	56.9	53.2	168.3	29.7	6.1	2.2
CDs + RPs + Cover Bills	87.7	8.3	12.8	12.0	48.7	8.6	3.2	1.2
Debentures Issued	126.4	12.0	9.1	8.5	174.4	30.7	0.0	0.0
Equity Capital	70.9	6.7	6.8	6.4	36.0	6.3	11.4	4.2
Others	223.6	21.2	21.3	20.0	139.9	24.7	252.2	92.4
Total	1,053.2	100.0	106.9	100.0	567.3	100.0	273.0	100.0
<USES>								
Loans to Corporations ³⁾	291.1	27.6	45.3	42.3	203.0	35.8	28.6	10.5
Loans to Households ³⁾	309.0	29.3	16.4	15.4	74.6	13.2	29.3	10.7
Loans to Others ³⁾	12.1	1.1	3.0	2.8	13.0	2.3	0.0	0.0
Securities	173.2	16.4	19.9	18.6	110.3	19.4	61.0	22.3
Derivatives	39.8	3.8	0.9	0.8	16.6	2.9	84.5	30.9
Others	228.0	21.6	21.4	20.0	149.8	26.4	69.7	25.5

Notes: 1) Covers only banking accounts

2) In domestic currency

3) Loans in domestic currency

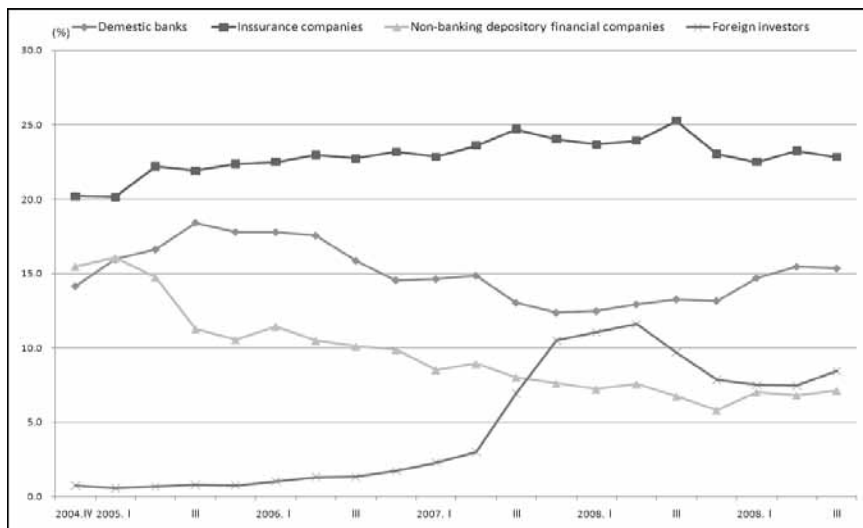
Source: Bank of Korea

2.4 Characteristics of Government Bond Market

The share of Korean Treasury Bonds (KTBs) in total government bond issuance in Korea amounted to 85% as of end-September 2009. Therefore, the government bond market in Korea will be explained centering on KTBs.

There are currently four types of KTBs issued, based on maturity: 3-year, 5-year, 10-year, and 20-year. KTBs are issued as fungible issues, meaning that the terms in the maturity and the coupon rates of the bonds issued within a certain period are the same, and the bonds issued during that period are treated as the same type. Due to increased liquidity through the raising of the volume of each type issued and the trading volume, interest expenses are saved and a credible benchmark rate is established.

Figure 4
Government Bond Holdings by Investor Group



Source: Bank of Korea

Figure 5
Outstanding Bond Issuance Amounts in Korea

(period-end, trillion won, %)

	2006		2007		2008		2009.9	
	amount	%	amount	%	amount	%	amount	%
Bonds	1,397.4	66.5	1,614.6	62.9	1,674.6	74.4	1,867.3	68.2
(Government Bonds)	224.3	10.7	240.4	9.4	272.3	12.1	311.1	11.4
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(Corporate Bonds) ²⁾	212.2	10.1	201.9	7.9	231.9	10.3	289.1	10.6

Note: 1) Monetary Stabilisation Bonds issued by the Bank of Korea (excluding those with maturities less than 1 year)

2) Total market value (based on listed companies)

Source: Bank of Korea

A primary dealership system was introduced in 1999 to stimulate the Treasury bond market. Primary dealers are financial institutions which have the right to participate in bidding in the primary market but are also under an obligation of market making through setting Treasury bond prices in the secondary market and so on. There are seven commercial banks and 12 securities companies designated as primary dealers.

The over-the-counter (OTC) market accounts for 80% of the secondary bond market in Korea. Before the Korean Government made

it mandatory for primary dealers to deal in the exchange market in order to develop the KTB market in October 2002, the OTC market accounted for around 99% of all bond trading. Since that implementation of measure, however, PDs have begun to trade increasingly in the exchange market, and the share of the exchange market has increased.

2.5 Regulations and Restrictions Regarding Banks' Business

Commercial banks are incorporated in accordance with the Banking Act and engage primarily in the business of collecting deposits, lending and payment settlement. The business of commercial banks can be sub-divided into three categories: indigenous business, incidental business, and concurrent business.

Indigenous business refers to the lending of funds typically acquired through deposits and securities issuance as well as the foreign exchange business. Incidental business refers to banking businesses that accompany indigenous businesses, such as payment guarantees, acceptance of commercial paper, mutual installments, securities investment, repurchase agreements, underwriting, securities sales and bancassurance. Concurrent business, which requires additional regulatory authorisation, includes the trust and credit card businesses.

Commercial banks must comply with management guidance set by the Financial Services Commission (FSC) in respect of capital adequacy, soundness of assets, liquidity and other matters necessary for securing management soundness. The principal objective of prudential regulations is to ensure sound management decisions. Because prudential regulations are designed not to supplant management decisions but to ensure minimum safety and soundness, they are a key component of market-oriented supervision. Where any bank is deemed to threaten serious harm to its sound management, due to failure to meet the guidelines, the FSC may require that it take measures necessary to improve its management, for example, imposition of requirement to increase its capital stock and restrictions on profit sharing.

Figure 6
Prudential Regulations

	Guidance Ratio
BIS Capital Ratio	$\frac{\text{Capital}}{\text{Risk Weighted Assets}} \geq 8\%$
Won Liquidity Ratio (for Won-currency denominated assets and liabilities with maturities of less than 1 month)	$\frac{\text{Accumulated won - currency assets}}{\text{Accumulated won - currency liabilities}} \geq 100\%$
Foreign Liquidity Ratio (for Foreign-currency denominated assets and liabilities maturity in less than 1 month)	$\frac{\text{Accumulated Foreign - currency assets}}{\text{Accumulated Foreign - currency liabilities}} \geq 85\%$
Foreign-currency Asset & Liability Gap ratio (for Foreign-currency assets and liabilities maturing within 7 days)	$\frac{\text{Accumulated foreign assets} - \text{Accumulated foreign liabilities}}{\text{Total foreign assets}} \geq 0\%$
Foreign-currency Assets & Liabilities Gap ratio (1-month) (for Foreign-currency assets and liabilities maturing within 1 month)	$\frac{\text{Accumulated foreign assets} - \text{Accumulated foreign liabilities}}{\text{Total foreign assets}} \geq -10\%$
Long-term Borrowing ratio for foreign currency loans	$\frac{\text{Foreign currency borrowing (longer than 1 year)}}{\text{Foreign currency loans (longer than 1 year)}} \geq 80\%$

The Banking Act bars commercial banks from operating in businesses including ① loans for the purpose of speculation in commodities or securities, ② loans made directly or indirectly on the pledge of a bank's own shares or on the pledge of shares in excess of 29% of the outstanding shares of another company, ③ loans made directly or indirectly for purchase of the bank's own shares, ④ loans made directly or indirectly to finance political activities, ⑤ loans to any of the bank's officers or employees except for small, insignificant loans as determined by the Financial Services Commission (FSC) /Financial Supervisory Service (FSS), ⑥ investment in stocks or other securities (excluding state bonds and BOK Monetary Stabilisation Bonds (MSBs) with a period of redemption not less than three years, which exceeds the 60% of its equity capital, ⑦ ownership of real estate (excluding real estate acquired through exercise of a security interest such as mortgage) other than real estate for business purposes, and ⑧ ownership of real estate used for business purposes in excess of 60% of the bank's equity capital.

3. Role of the Bank of Korea

The Bank of Korea Act provides that the sole purpose of the Bank is to contribute to the sound development of the national economy by pursuing price stability through the formulation and implementation of efficient monetary and credit policies. Practically, however, the Bank's policy objectives involve the following three:

- (a) Price Stability — the Bank conducts monetary policy to pursue price stability under an inflation targeting regime,
- (b) Safety and Efficiency of the Payment System — the Bank is responsible for the safety and efficiency and oversight of the payment and settlement system in Korea, and operates BOK-Wire+, which serves as the center of all payment systems,
- (c) Financial stability — the Bank constantly monitors the market developments and analyses the flows of funds among financial institutions, while, if necessary, carrying out joint examinations of banks with the FSS.

3.1 As a Liquidity Provider

The Bank of Korea adjusts market liquidity including banks' reserves through open market operations, so that the call rate does not deviate too far from the policy Base Rate set by the BOK's Monetary Policy Committee (MPC).

There are two types of open market operations: operations involving the issuance of MSBs and the purchases and sales of securities.

MSBs, which are issued only by the BOK, originated as a major tool of monetary policy during the period when the volume of government and public bonds essential for open market operations remained insufficient. These central bank obligations have relatively long maturities, and once issued are not in principle redeemable prior to maturity. Thus, they are used as a major structural adjustment tool whose policy effects are long lasting. Currently, a ceiling on the issuance of MSBs is set by the MPC every three months, in consideration of market liquidity conditions. MSBs are issued in 11 different maturities ranging from 14 days to two years.

Securities transactions, meanwhile, are employed to supply or withdraw funds through the sale and purchase of government and public bonds as a tool adjusting short-term liquidity. Securities eligible for use in such transactions are confined to government bonds, government-guaranteed bonds and MSBs, in consideration of the credit risk involved and the efficiency of open market operations.

Open market operations involve both outright transactions and repurchase agreements or Repo (RP) transactions. Among outright transactions, outright sales, which soak up liquidity, have found little use since they have the same effect as issuance of MSBs.

Outright purchases, which supply liquidity, have in contrast been employed to expand the pool of securities available for use in open market operations, although apart from that, they have not been frequently used, as market liquidity generally remains in a state of structural surplus.

Accordingly, securities transactions focus mostly on RP transactions used as an instrument for routine liquidity adjustment. The longest RP maturity stands at 91 days, however, the maturities of most RP contracts range from overnight to 14 days, as they are used as a tool for fine-tuning of shortages and excesses of reserve funds. With the reform of the monetary policy operational framework in March 2008, the carrying out of RP transactions as and when necessary was changed so that it is now done on a regular basis, with 7-day RP transactions offered once a week on Thursdays. Since then, 7-day RP transactions have become the mainstay of overall transactions.

Its lending facilities allow the central bank to provide loan support to individual banks. The loan policy of the BOK is operated by the rediscounting of bills that banks have received from corporations in return for loans, or by extending loans to banks against the collateral of eligible securities. The eligibility of securities that may be used as collateral is strictly regulated; only credit securities such as re-discountable bills, Treasury bonds, government-guaranteed bonds and MSBs are recognised as eligible collateral. When shortages of liquidity occur due to financial market instability or incidents, such as computer system failures, the MPC may temporarily extend eligibility to other assets apart from those mentioned above. The lending facilities of the BOK available to financial institutions consist of Liquidity Adjustment Loans, Aggregate Credit Ceiling Loans, Intra-day Overdrafts and Special Loans.

Figure 7
Bank of Korea Lending Facility (as of October 2009)

	Function	Ceiling	Rates	Maturity
Liquidity Adjustment Loans	Constraining excessive volatility of money interest rates	—	The Bank of Korea Base Rate + 100bp	Overnight
Aggregate Credit Ceiling Loans	Inducing banks to expand loans to small and medium-sized enterprises	10 trillion won	1.25% per annum	One month
Intraday Overdrafts	Supporting banks experiencing temporary shortages of funds for payment and settlement in the course of the day	—	Yield on three-year Treasury bonds — the call rate	Close of the business day
Special Loans	Extension of loans as the lender of last resort	Determined in individual case		

3.2 As a Financial Regulator

Before April 1998, the BOK Office of Bank Supervision had full authority to supervise commercial banks. Four separate supervisory agencies (the BOK, the Securities Supervisory Board, the Insurance Supervisory Board, and the Non-bank Supervisory Authority) executed sectional supervision.

Since April 1998, however, the Financial Services Commission (FSC) and the Financial Supervisory Service (FSS), as a consolidated body, have had the supervisory power. The BOK exercises supervision-related functions within a limited scope. It has the right to request materials, the right to undertake joint examinations, and the right to appeal for reconsideration of a decision of the FSC.

The role of ensuring financial stability is the central bank's original role, irrespective of its having full financial supervisory authority or not. The role includes monitoring of the financial system and evaluation of its stability, analysis of management statuses and conduct of joint examinations of financial institutions, operation and supervision of the payment and settlement system, provision of emergency liquidity assistance, and publication of the Financial Stability Report. More specific details follow.

The BOK monitors the financial system and evaluates its stability. It reviews domestic and overseas economic conditions, analyses the financial market environment and examines the debt servicing capacity of the household and business sectors to get an overall picture of financial

institution soundness. The Bank also contributes to the maintenance of financial stability by identifying and publicising potential risk factors in the financial sector, to prevent them from causing financial system unrest.

The BOK analyses the management statuses of financial institutions and evaluates their soundness, based upon information collected from reports and surveys, while, if necessary, conducting joint examinations of institutions with the FSS. These efforts enhance the effectiveness of the BOK's monetary policy and contribute to the maintenance of financial system stability, by allowing the Bank to more accurately understand the business conditions of individual financial institutions and to collect and evaluate various kinds of on-site information.

The BOK publishes a regular Financial Stability Report, which includes analysis of the current status and potential risks of Korea's financial system and an overall assessment of its stability. The main purpose of the report's publication is to further strengthen financial system stability, by stimulating the market participants' active discussion of a wide range of risk factors in the financial sector under the rapidly changing global financial environment. The BOK began to publish the Financial Stability Report, the first of its kind in Asia, from April 2003, and has since then continued to publish it twice a year.

3.3 Collateral Criteria for Borrowing from the Central Bank

In November and December 2008, to facilitate the movement of funds into the bond market, the BOK included bank debentures and certain government agency bonds among securities eligible for use in open market operations which were originally Treasury bonds, government-guaranteed bonds and MSBs. In December, additional 12 securities companies were selected to join the existing 19 banks, one securities company, and the Korea Securities Finance Corporation as the BOK's counterparts for RP transactions.

Figure 8
Expansion of Eligible Securities and Counterparts of Open Market Operations

	Eligible securities	Eligible counterparts
Preexistence	- Treasury bonds	- 19 Banks
	- Government guaranteed bonds	- Woori Investment & Securities
	- Monetary stabilization bonds(MSBs)	- Korea Securities Finance Corp.
Addition	- Bank debentures ¹⁾	- 12 Securities companies
	- Bonds issued by government agencies	
Remark	- Valid until Nov.6, 2009	- Valid until Jul.31, 2009

Note: 1) Debentures issued by financial institutions subject to ‘Banking Act’, Korea Development Bank, Industrial Bank of Korea, National Agricultural Cooperative Federation, National Federation of Fisheries Cooperatives, and Export-Import Bank of Korea

The BOK drew up a plan for improvement of the collateral system for its lending facilities, which it then put into effect from February 9 this year. Credit instruments² held by financial institutions were allowed to be used as collateral for the Bank’s lending facilities³ -- its Liquidity Adjustment Loans and Intra-day Overdrafts, in addition to its Aggregate Credit Ceiling Loans. Moreover, by abolishing conditions for the eligibility of credit instruments, the BOK allowed as acceptable collateral all credit instruments with remaining maturities of not more than one year acquired by financial institutions against loans.

A haircut ratio scheme was also introduced for marketable and non-marketable securities. According to this, the collateral value of a marketable security is assessed on a mark-to-market basis, with adjustment by a certain haircut depending upon the remaining maturity and the method of principal and interest repayment. For non-marketable government and public bonds, 80% of the face value (the issue price in the case of discounted bonds) is recognised as the collateral value. For credit instruments, 70% of the financial institution’s loan principal is recognised.

2. Promissory notes and bills of exchange accepted by banks when making loans to firms.

3. Liquidity Adjustment Loans, Intra-day Overdrafts and Aggregate Credit Ceiling Loans.

Figure 9
Haircut Ratios

Marketable securities		Non-marketable securities	
Remaining maturity 1)	Haircut 2) (%)	Securities	Collateral value(%)
1 year and less	2(2)	Government and public bonds	80% of face value (issue price in the case of
3 years and less	3(4)		
5 years and less	4(5)	Credit instruments ³⁾	70% of the financial institutions' loan principal
more than 5 years	5(6)		

- Notes: 1) Remaining maturity is fixed on the day the market price is appraised.
 2) Coupon bond basis, figures in parentheses are discount bonds and other securities without coupons.
 3) Promissory notes and bills of exchange accepted by banks when making loans to firms.

4. Development and Determinants of Liquidity Risk

4.1 Liquidity Profile in Korean Financial System

Since March 2009, liquidity conditions in the Korean financial system have recovered rapidly from the severe shock arising from the global financial crisis following the Lehman Brothers' bankruptcy filing in September 2008. This has been mainly due to the easing of international financial market unrest and the proactive policy responses of the Korean government and the BOK.

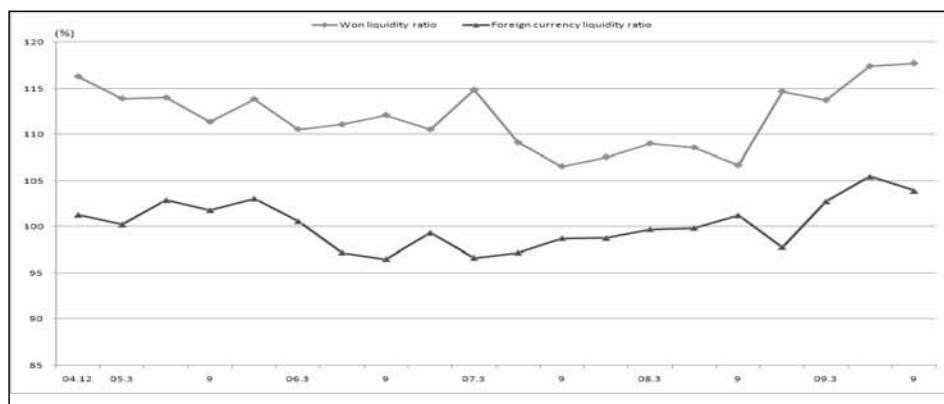
4.2 Development of Liquidity Indicators

4.2.1 Funding Liquidity

The average won liquidity ratio of Korean commercial banks was 117% as of end-September 2009, having shown an upward trend since September 2008 when it hit a bottom of 107%. The level of the ratio was much higher than the guideline Korean banks are required to observe. In fact, no Korean banks have been unable to maintain liquidity ratios of 100% or higher since the end of 2004.

The average foreign currency liquidity ratio of Korean commercial banks recorded 104% in September 2009, much higher than the guideline of 85%.

Figure 10
Liquidity Ratios of Korean Commercial Banks (2004.4/4~2009.3/4)

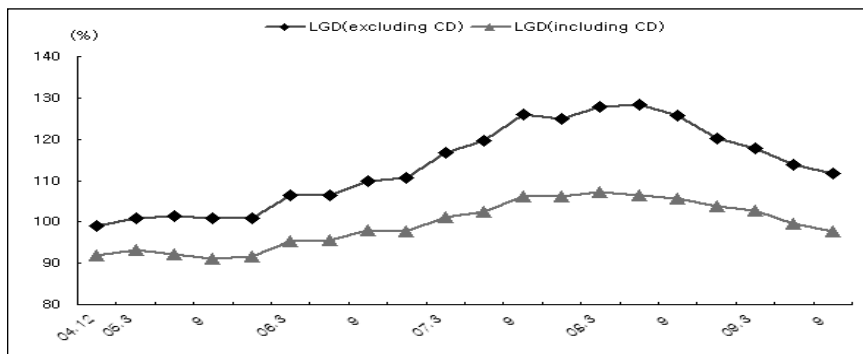


The average loan-to-deposit ratio (excluding Certificates of Deposit [CDs]) of Korea commercial banks was 111.7% at the end of September 2009 having followed a downward trend since June 2008 when it hit a peak of 128.3%, but still well over 100%.

CDs are generally excluded when we calculate loan-to-deposit ratios as CDs are issued to take large funds usually targeted for institutional investors such as securities firms and MMFs. However, in the case of the Korean banks, CDs are largely marketed through their retail branch networks. In other words, the stability of CDs is similar to that of deposit as the Korean banks are using CDs for taking funds from households who want higher interest rate.

Given the nature of CDs in the Korean banking sector, the average loan-to-deposit ratio of Korean commercial banks with CDs, included has remained stable; it had only increased to 108.2% in March 2008 from 92.0% in the end of 2004. It also decreased to 97.8% in September 2009 having remained below 100% since June 2009.

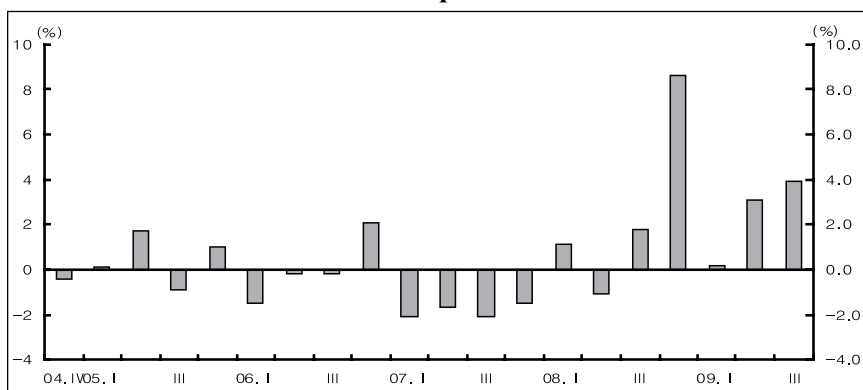
Figure 11
Average Loan-to-deposit Ratio of Korean Commercial Banks
(2004.4/4~2009.3/4)



Source: Financial Supervisory Service

The retail deposit growth rate has reversed to an increasing trend since the 3rd quarter of 2008, partly due to the Korean commercial banks' own efforts to increase the ratio of this stable source of funds instead of relying excessively on wholesale funding, and partly due to growing investor preference for safe assets.

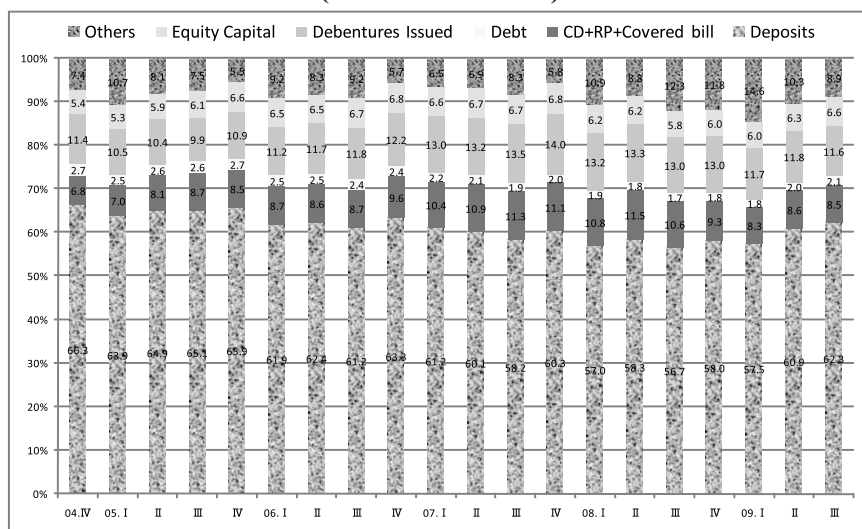
Figure 12
Trend of Retail Deposit Growth Rate



Source: The Bank of Korea

Until the global financial crisis broke out after the collapse of the Lehman Brothers in September 2008, Korean commercial banks were relying more and more on wholesale funding. The share of wholesale funding in total sources of funding hit a peak of 24.9% at the end of June 2008, and then reversed to a sharp downtrend. As of end-September, 2009, the wholesale funding ratio had declined to 20.1%.

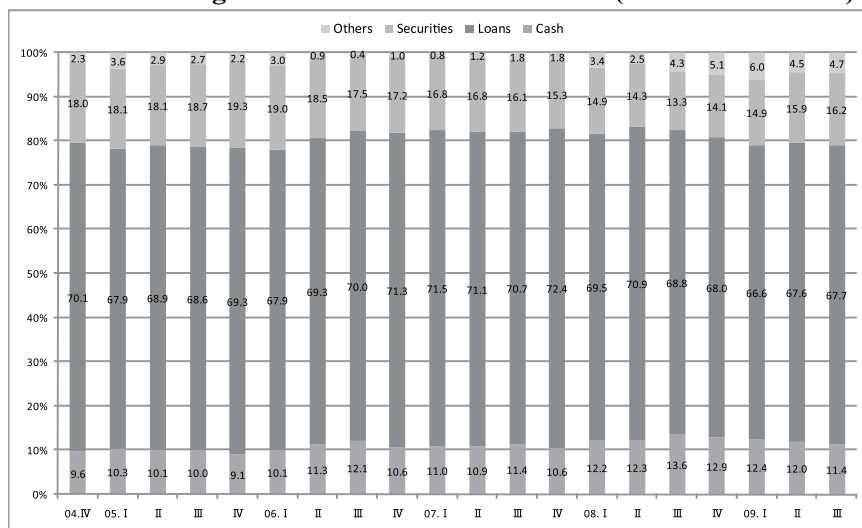
Figure 13
Sources of Funding of Korean Commercial Banks
(2004.4/4~2009.3/4)



Source: Financial Supervisory Service

Korean commercial banks' fund usage centers on extension of loans. The ratio of loans to total assets has been maintained at around 70%. Securities and cash account for around 15% and 10%, respectively.

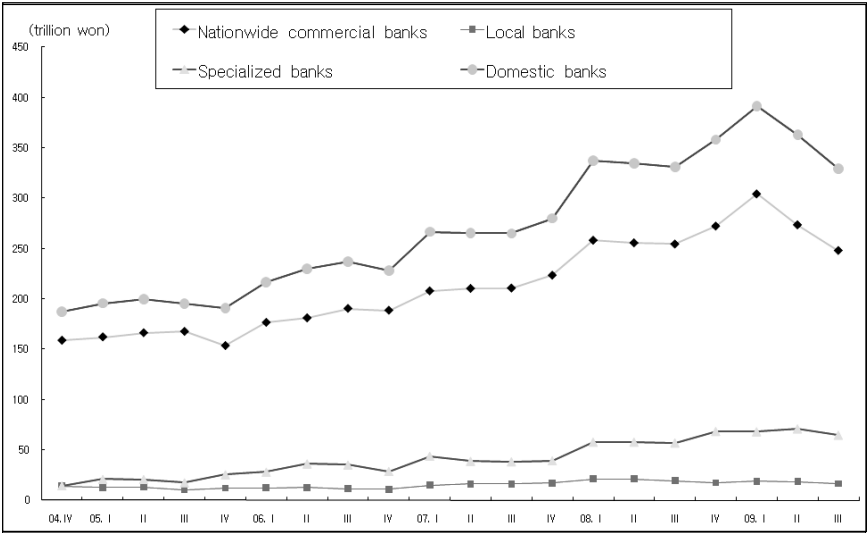
Figure 14
Uses of Funding of Korean Commercial Banks (2004.4/4~2009.3/4)



Source: Financial Supervisory Service

The positive maturity gap between assets and liabilities of within 3-month maturity has shown an upward trend. Since the first quarter of 2009, however, the positive maturity gap of nation-wide commercial banks has decreased, in line with the change in the base maturity of the liquidity ratio (from 3-month to 1-month).

Figure 15
Maturity Gap for 3-month Maturity Bucket (2004.4/4~2009.3/4)



Source: Financial Supervisory Service

4.2.2 Market Liquidity (Monthly Data from 2005-2009)

The concept of market liquidity includes several characteristics of a given market. These characteristics are tightness, depth and resilience.

Tightness of the market means the difference between the prices at which a financial instrument can be bought and sold. Tightness is measured by the bid-ask spread, which in normal times is determined mainly by structural characteristics in the market. In cases where there is a lack of liquidity, however, market-makers will increase their bid-ask spreads to compensate for the possibility that they might be unable to sell the assets they are holding.

Depth of the market means volume of trading possible without effect on prevailing market prices. Resilience of the market means the speed at which price fluctuations resulting from trading dissipate. Depth

and resilience are measured by return to volume. In illiquid conditions, the price will move more for a given trading volume, so the return to volume will be higher.

In addition to the three characteristics just described, many academic researchers refer to the liquidity premium. They suggest that investors will require a higher liquidity premium for assets with greater market liquidity risk.

In consideration of these facts, three measures -- bid-ask spread, return to volume, liquidity premium are therefore used to measure market liquidity.

Among the major central banks, the Bank of England and the European Central Bank calculate a composite market liquidity indicator to monitor their market liquidity conditions. The composite market liquidity indicators of both banks cover seven markets and eight individual measures.

4.3 Measuring a Korean Market Liquidity Indicator

The process of calculating a Korean financial market liquidity indicator has five steps:

Figure 16
Process of Calculating Market Liquidity Indicator

Step	Details
Step 1	Selecting appropriate individual financial markets
Step 2	Determining liquidity measures for individual markets
Step 3	Calculating individual market liquidity measures
Step 4	Normalising individual market liquidity measures (standard deviations from historical average)
Step 5	Calculating composite liquidity indicator

The indicator measuring liquidity of the Korean financial markets is based upon quantitative and price data from seven domestic financial markets and nine individual measures.

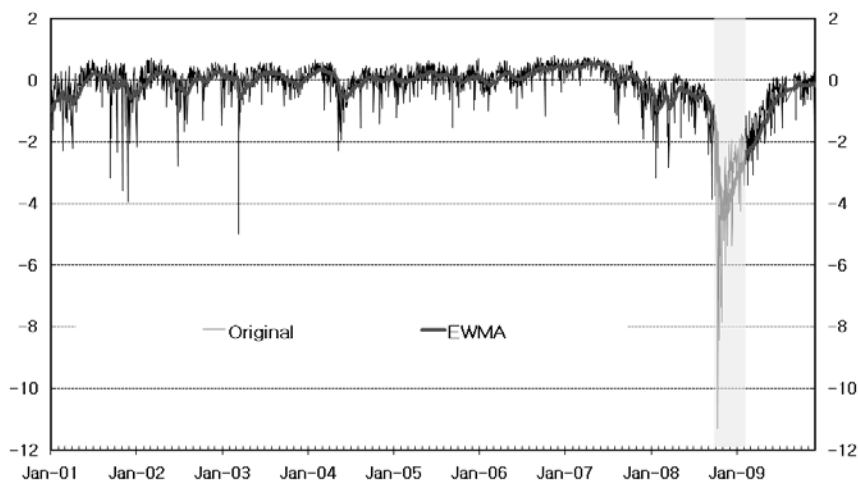
Figure 17
Liquidity Measures for Korean Financial Market

Market	Bid-ask spread	RTV	Liquidity Premium
Treasury bonds	-	O	-
Corporate bonds	-	O	O
Stock market	O	O	-
FX-market	-	O	-
Equity index options	-	O	-
Equity index futures	-	O	-
Interest rate futures	-	O	-

Figure 18 shows the summarised composite indicator, which indicates the situation of market liquidity. Until the end of the first half of 2007, market liquidity was relatively strong. After that, it started to fall, and then dove sharply after the bankruptcy filing of Lehman Brothers (2009.9). The gray area is the period in which the BOK implemented numerous policies to stabilise the financial system and supply liquidity, from October 2008 to February 2009.

Due to the easing of international financial market unrest, liquidity conditions in the Korean financial system have improved rapidly since March 2009. Surplus liquidity increased, the loan-to-deposit ratio has fallen, as deposits have increased more than loans, and the foreign debt environment has improved owing to the decrease in CDs premium. With the sharply reduced volatility of the financial markets, market liquidity condition has returned to their pre-crisis level.

Figure 18
Market Liquidity Indicator (2004.12~2009.9)

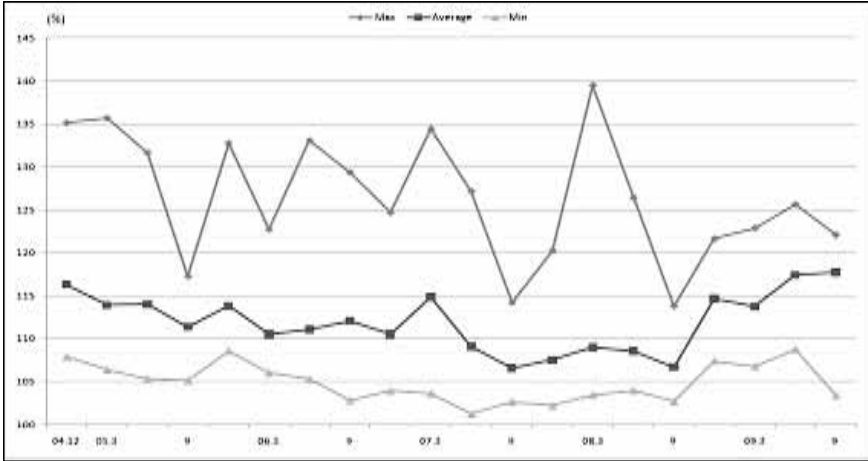


Supervisors increasingly point to the liquidity risk of banks as a major factor behind the financial stability of markets worldwide. Liquidity problems within an individual bank have the potential to propagate not only to other banks but also throughout the entire global financial environment. The ongoing crisis in the subprime segment of real estate mortgage lending in the U.S. is the most recent example. A phenomenon that started as a narrowly focused fear regarding increased delinquency in one specific financial sector has since widened its effects to bring about a systemic liquidity shortage globally.

4.3.1 Qualitative Measures

There is no case in which Korean commercial banks have approached or breached the regulatory limits. Even banks with the lowest level of liquidity ratio well exceed the regulatory requirement of 100%. The nearer a bank approaches a 100% of liquidity ratio, the more the bank can be viewed as carrying out efficient risk management, in light of the costs and benefits of liquidity management. Therefore a bank may not be estimated to be risky just based on its liquidity ratio near 100%. In fact, subsidiaries of foreign banks which can borrow funds from holding companies tend to maintain their liquidity ratios nearer 100%.

Figure 19
Liquidity Ratios of Korean Commercial Banks

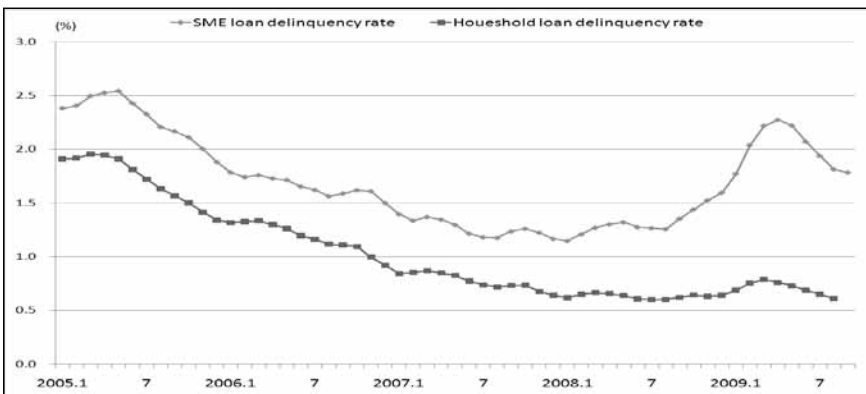


Source: Financial Supervisory Service

Bank asset quality has remained at a very high level. In fact, there have been no bad loan problems during the recent global financial crisis.

The delinquency rate of corporate loans declined to 1.78% as of end-September 2009, after hitting around 2.27% at end-April. The delinquency rate of household loans has stayed at below 1% since the end of November 2006.

Figure 20
Delinquency Rates



Note: Rates are three-month moving averages, based upon loans delinquent one day or longer.

Source: Financial Supervisory Service

4.4 Factors Affecting Liquidity Risk in Korea

The cause of the liquidity problems which the Korean financial system has experienced throughout the recent global financial crisis can be summarised as a sudden rise in uncertainty. Given the Korean economy's large trade volume and financial integration with the rest of world, investors' views of it deteriorated when global de-leveraging intensified and world growth slowed markedly.

The immediate impact appeared in the bond markets, as foreigners began to repatriate their funds from the Korean financial market. The outstanding balance of bonds held by foreign investors in the Korea bond market decreased to 35.3 billion won at the end of April 2009, from its peak of 51.5 billion won at end-August 2008. The outflow of foreign investors fund led to the evaporation of liquidity in the bond market. As a result, domestic credit spreads on corporate and bank bonds also widened rapidly, and Korean banks had difficulties in issuing bank bonds in the domestic and international bond markets.

Korean banks' high loan-to-deposit ratios also amplified foreign investor risk aversion toward them. The loan-to-deposit ratio of Korean commercial banks has stayed above 100% for a long time, and at end-June 2008, hit a peak of around 130%. A loan-to-deposit ratio over 100% means that a bank has to fund its loans from non-deposit sources, such as bank bonds. Bank bonds are not a stable source of funds, since unexpected redemptions by creditors that may occur during a market downturn force a bank to repay creditors by selling off assets. Since loans are usually not liquid assets, the bank can face a liquidity problem. In normal times, a high loan-to-deposit ratio does not concern investors due to the affluence of market liquidity. In stress times, however, it does.

5. Management of Liquidity Risk by Commercial Banks

Won-liquidity ratio requirement was introduced by the FSS after the foreign currency crisis of 1997. The FSS required banks to maintain the won liquidity ratios, calculated based on won-denominated assets and liabilities with remaining maturities of three months or less, at above 100%. Since October 2008, the won liquidity ratio has been based on assets and liabilities with remaining maturities of one month or less.

For foreign currency liquidity, the FSC/FSS requires banks to maintain internal foreign currency liquidity management systems based on the maturity ladder approach.

After July 1997, banks were required to maintain minimum liquidity ratios of 70% for assets and liabilities denominated in foreign currencies maturing in less than 90 days. In April 2004, the mandatory ratio was raised to 85%. The ratio is calculated by including the foreign currency-denominated assets and liabilities of overseas subsidiaries and offshore accounts with the foreign currency-denominated assets and liabilities of both the head office and domestic/overseas branches. Since January 1999, banks have also been required to maintain positive maturity gap ratio for residual maturity period no longer than seven days and negative 10% or higher ratios for residual maturity periods no longer than one month. Banks are also required to finance 50% of their foreign currency-denominated borrowings in maturities of one year or longer.

The FSC/FSS regularly monitors banks' compliance and liquidity statuses and may take action against banks that do not meet the foreign currency liquidity requirements. Banks should report the reasons for this and the corrective actions taken in response in the event of violating their liquidity ratio requirement.

5.1 Regulations on Liquidity Risk Management

Banks are also required to have risk management system in place as following by regulation.

5.1.1 Risk Management System

- (1) A financial institution shall establish a system for ensuring timely recognition, assessment, monitoring, and control of various risks arising in all kinds of transactions and for evaluating and managing the appropriateness of its inside capital.
- (2) For efficient risk management, a financial institution shall set up and operate adequate risk-bearing and transaction limits by department, transaction or person in charge.
- (3) A financial institution shall assess and manage, for each type of transaction, its credit risk (including risk of placing too much emphasis on credit), operation risk, market risk,

risk of interest rate in non-trading position (banking book), liquidity risk, risk of strategy and reputation and other various risks which may occur.

- (4) A financial institution shall comprehensively recognise and monitor any significant change in risks in connection with its subsidiaries.
- (5) The Governor may evaluate the risk management, appropriateness of inside capital and management system of financial institutions, and reflect the results thereof in his supervisory and examining functions.

5.1.2 Risk Management Organisation

- (1) The board of directors of a financial institution shall deliberate and decide on the matters necessary for risk management falling under any of the following items. (If necessary, for efficient risk management, a committee for risk management may be established in the board of directors to take over these duties.)
 - a. Establishment of basic policy on risk management consistent with the management strategy;
 - b. Determination of risk levels which the financial institution can bear;
 - c. Approval of limits on optimum investments or limits on loss allowances; and
 - d. Establishment and revision of regulations on risk management.
- (2) A financial institution shall set up a risk management unit for comprehensive management of the risks which may occur in its business and providing support to the board of directors (including the committee) and management.
- (3) The risk management unit shall be independent of other business departments and perform duties under any of the following items:
 - a. Examination and analysis of operational status of risk limits;
 - b. Operation of the risk management information system; and

- c. Timely submission of risk management information to the board of directors (including the committee) and management.

The FSS has produced the guidance *Bank Standards on Liquidity Risk Management* with a view to strengthening domestic banks' liquidity risk management.

The guidance contains a comprehensive treatment of liquidity risk management systems, including liquidity risk management, stress tests, and contingency funding plans. Banks shall establish and operate liquidity risk management strategies comprising at the minimum liquidity risk management targets, management policies, and internal controls. The board of directors of a bank will approve and review the strategies with respect to reports on liquidity conditions and stress test results submitted on a regular basis. Banks are required to assess their liquidity-related costs and risks for reflection in their performance evaluations and in their process for approval of new products. In particular, banks should manage their liquidity risk tolerance through accumulated net cash outflows derived from their financial positions and funding capacities. Banks are to establish and operate early warning systems. Funding sources should be diversified to prevent concentration in a particular currency and maturity.

Banks shall conduct stress tests regularly and reflect the results in their liquidity risk management strategies, risk tolerance, and contingency funding plans. They are also required to make practical contingency funding plans with respect to the graduated stress levels and regularly review these plans for appropriateness. The FSS plans to provide guidelines that include review of previous management cases, to help banks' liquidity risk management systems take fast and firm root.

6. Lessons Learned in Korea

6.1 Trends in Liquidity Risk Management Practices Before and After Recent Global Financial Crisis

The typical liquidity risk management of Korean banks before the recent global financial crisis can be described and evaluated as follows.

For their everyday management of liquidity risk, Korean commercial banks draw up monthly asset and liability management plans, taking into account the prudential liquidity ratio set by the

financial supervisory authorities, and review and analyse the results of implementation of those plans on a monthly basis. Aside from their liquidity ratios, banks use a variety of other liquidity management indicators, including the volumes of their short-term funding shortfalls and their liquidity gaps. Most indicators used by banks are for measuring and managing short-term liquidity, however, and medium- to long-term or structural liquidity management is comparatively neglected.

Aside from these procedures for routine liquidity risk management, banks also have multi-stage contingency plans for responding to sudden liquidity shocks, and they conduct stress tests to internally measure their capacities for coping with situations of crisis and to identify any vulnerability. Banks' liquidity contingency plans usually distinguish three stages of crisis and use a series of crisis indicators. When an indicator falls or rises above a certain threshold value, banks undertake appropriate crisis response measures as laid down in their plans. However, these liquidity contingency plans leave something to be desired, in terms of response measure effectiveness and more particularly in terms of the effectiveness of their emergency funding measures. Moreover, banks' liquidity contingency plans need to be more closely aligned with their stress tests. Meanwhile, by taking into consideration a more comprehensive set of liquidity risk factors, including off-balance sheet items, such as loan commitments and derivatives trading activities, the stress tests could be made more reliable and accurate.

To address these weaknesses in liquidity risk management procedures and ensure their relevance to the changing financial and economic environment, banks must make a variety of improvement efforts. First, their liquidity risk management systems should not just focus on short-term horizons, but also consider the long-term stability and efficiency of their funding and liquidity management structures. Second, to develop stable sources of funding, they must design diversified and competitive deposit products that meet the needs of their customers. Third, with the understanding that even institutions having healthy assets and sound profitability can be brought to their knees if they lack adequate liquidity risk management skills and procedures for responding to unforeseen shocks, banks must strive to improve their risk analysis techniques and enhance the effectiveness of their contingency plans. In line with the changing financial and economic environment, they should also work to implement more broad-based and updated stress testing systems.

As for the financial authorities, they must step up their efforts to monitor banks' funding practices and their maturing assets and liabilities, so as to detect and respond to potential liquidity risk in a timely fashion. The financial authorities should also encourage banks to improve their liquidity risk management capacities, by consulting with them on means of more effectively capturing liquidity risk and on further development of crisis scenarios for stress testing.

6.2 Role of Liquidity Risk in Triggering Past Financial Crises, including a Fast Case Study

Korea experienced a twin crisis – i.e., a banking and currency crisis - in late 1997. Although various factors, including structural weaknesses (for example, the over-leveraged corporate sector), can be attributed to the crisis, the buildup in short-term debt and foreign currency exposure may have been the immediate reasons why Korea was so suddenly hit by financial contagion and a sudden capital flow reversal following the outbreak of the Southeast Asian crisis earlier that year.

The rapid buildup of private short-term external debt created the potential for liquidity problems. In the early 1990s, Korean financial institutions borrowed short-term external debt and used it to finance long-term investment by corporations in line with the Korean government's expansion of short-term overseas borrowing by removal of controls on such borrowing by banks. As a result, the short-term external debt of financial institutions increased rapidly, creating maturity mismatches. The short-term external debt rose from US\$40 billion in 1993 to US\$98 billion at end-September 1997, when it represented 54% of total external liabilities. And the ratio of usable international reserves to short-term debt (on a residual maturity basis) fell from 42% in 1993 to 29% at end-1996.

Before outbreak of the crisis, strong macroeconomic performance made the risk invisible. However, the changing external environment, including increased oil prices, falling semiconductor prices, and depreciation of the Japanese yen, together with slowing of the domestic economy, gradually revealed the weaknesses in Korea's corporate and financial sectors that had been hidden behind its impressive growth record.

After devaluation of the Thai baht in July 1997, international banks began to reduce their exposure to Korean financial institutions and

to cut back their short-term credit lines. Korean banks scrambled to find foreign currency to repay their loans that were no longer being rolled over.

6.3 Development of Liquidity Situation (in Banking Sector) Before and After Recent Global Financial Crisis

The banking sector liquidity remained abundant before and after the recent global financial crisis. Before the crisis, Korean banks did not have difficulty getting the funds necessary to rapidly increase their assets centering on loans, through wholesale funding including CD and bank bonds issuance. After the crisis, Korean banks also enjoyed abundant liquidity as their deposits increased rapidly due partly to banks' own efforts to improve liquidity and partly to growing investor preference for safe assets.

As a result, the funding structures of commercial banks have gained in stability, as the share of deposits in their total funding has grown and that of wholesale funding declined. Banks' liquidity premium (assessed based upon bank bond interest rate and swap rate data), after having surged to 370bps in early December 2008, has since then narrowed to settle in the 90bps range in October 2009. This is a reflection of a vast improvement in bank liquidity positions over the same period.

6.4 Future Prospects

In September 2009, the FSS produced the guidance *Bank Standards on Liquidity Risk Management*, containing a comprehensive treatment of liquidity risk management systems, including liquidity risk management practices, stress testing, and contingency funding plans. Therefore, it is expected, that more sophisticated and integrated liquidity risk management will be effected in the future.

The FSC announced a plan to implement guidelines for loan-to-deposit ratios (which were abolished after the 1997 currency crisis) during 2010. As a result, commercial banks' loan-to-deposit ratios (excluding CDs) are expected to decline although they still hover above 100% on average. This is an indication of continuous improvement in banks' liquidity risk management.

7. Conclusion and Policy Recommendations

7.1 Conclusion

It is well known that among Asian countries Korea was hit most severely by the global financial crisis following the collapse of Lehman Brothers. As of the end of November 2008, the Korean won had depreciated by over 25.4% in dollar terms since the September Lehman Brothers failure, the largest rate of decline among major Asian countries except Turkey. The Stock prices in Korea had plummeted 27.2% during the same period. External debt conditions for Korean banks had deteriorated severely due to the evaporation of global liquidity and the CDs (5-year) premium on Foreign Exchange Stabilisation Fund bonds shown a marked upward trend (9.14 135bp → 11.30 368bp).

The Korean financial system then regained its stability rapidly from the beginning of 2009, as the liquidity crunch caused by the international financial market turmoil eased. Compared with other countries, in fact, Korea had appeared to have advantages in enduring the shock from the global crisis -- thanks to the cushion of its substantial volume of official reserves, its improved policy framework, and its very limited exposure to toxic assets. The severe degree of the shock that hit Korea therefore seems a little surprising.

Even before the global financial crisis, however, worries about the liquidity risk of Korean commercial banks had been voiced, as their exposures to liquidity risk have widened due to their expansionary drives centering around loan assets and their deepening reliance on wholesale funding. These factors might have led to the rapid deterioration of foreign investors' views on Korean banks.

7.2 Policy Recommendation

The policy authorities need to induce Korean banks to lower their loan-to-deposit ratios (excluding CDs) which still hover above 100% and to decrease their reliance on wholesale funding.

In fact, the ratio of loans to deposits has been pointed out as a source of fragility at Korean banks. Loan-to-deposit ratios over 100% mean that a bank has to fund loans from non-deposit sources, such as bank bonds. When liquidity is abundant in the financial markets and system, wholesale funding can be regarded as more efficient than traditional

funding including deposits, because wholesale funding does not require stable and widespread sales networks for efficient access to customers -- which is essential to retail deposit-taking.

Bank bonds are not a stable source of funds, however, since unexpected redemptions by creditors may occur during a market downturn to force a bank to pay back creditors by selling off assets. Since loans are usually not liquid assets, a bank can in this case face a liquidity problem.

To lower their loan-to-deposit ratios, banks should make efforts to attract more deposits, while increasing loans at a more moderate pace.

Banks must also strive to improve their risk analysis techniques and enhance the effectiveness of their contingency plans. In line with the changing financial and economic environment, they should additionally work to implement more broad-based and updated stress testing systems. Even institutions having healthy assets and sound profitability can be brought to their knees if they lack adequate liquidity risk management skills and procedures for responding to unforeseen shocks.

As for the financial authorities, they must step up their efforts to monitor banks' funding practices and their maturing assets and liabilities, so as to be able to detect and respond to potential liquidity risk in a timely fashion. The financial authorities should also encourage banks to improve their liquidity risk management capacities, by consulting with them on means of more effectively capturing liquidity risk and on further development of crisis scenarios for stress testing.

MALAYSIA LIQUIDITY RISK: SAILING THROUGH THE TURBULENT YEARS

by Syarurizal Mohd Sabri¹

1. Overview of Financial System and Commercial Bank Industry in Malaysia

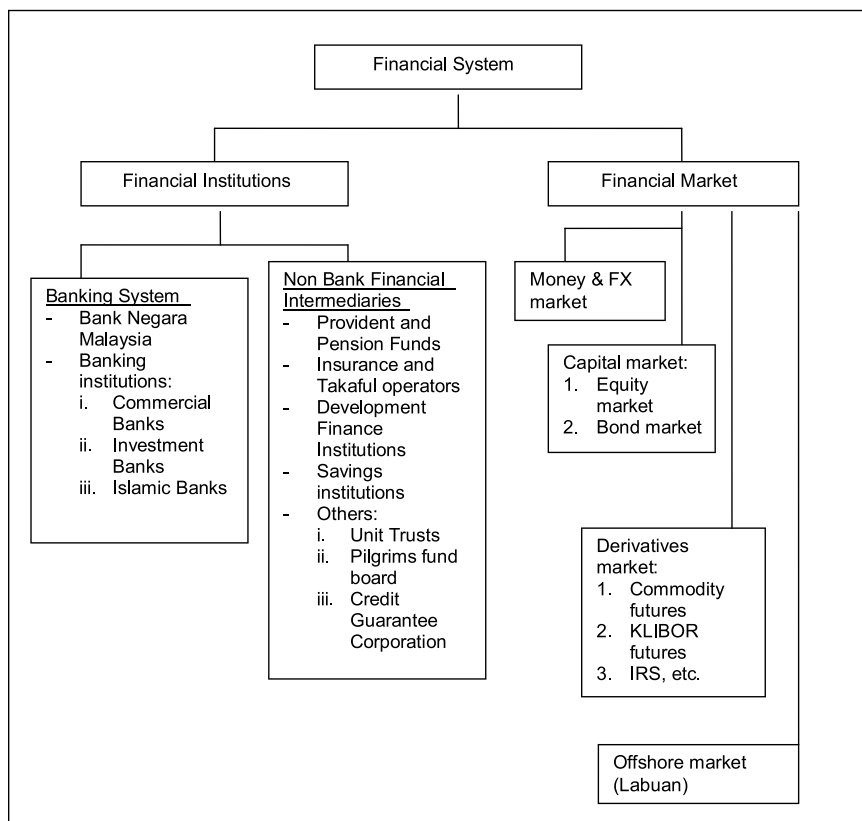
The Malaysian financial system may be divided into two main structures, Financial Institutions and Financial Market. The Financial Institutions comprise the Banking System and Non-Banking Financial Intermediaries, while the Financial Market consists of four major markets, namely, the Money & Foreign Exchange Market, Capital Market, Derivatives Market and Offshore Market. An overview of the Malaysian financial system is presented in Figure 1.

1.1 Share of Banking Sector vs. Capital Market (Bond and Equity Market)

The banking sector is a significant player in the Malaysian debt securities market more as a subscriber than as an issuer. This is evident from the average subscription of 34% of debt securities outstanding amount between May 2008 to June 2009, while exposure to equity is, on average, only 0.2% of the outstanding amount for the same period. As at June 2009, the outstanding amount of the debt securities and equity² markets stood at RM622b and RM821b, of which the banking sector subscribed 27% and 0.258%, respectively. Apart from banks, other major subscribers in debt securities market include asset management companies, insurance companies, pension funds and unit trusts.

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1. Senior Executive of the Banking Supervision Department of Bank Negara Malaysia. The opinions expressed by the writer in this research paper do not necessarily reflect the views of the Bank Negara Malaysia. Any data published within this paper should be used in good faith. Furthermore, this research should only be used for academic purposes in enriching and enhancing the study of funding and market liquidity risks as well as appropriate regulatory and supervisory response within the central banks members of SEACEN. This research should be periodically reviewed and enhanced to ensure any obsolete or misrepresented opinions be corrected.
 2. Equity, as defined by Malaysia Exchange, includes Share Capital, Fixed Income Securities, Exchange Traded Funds, Warrants, Property Trusts and Close End Funds.

Figure 1
Overview of Malaysian Financial System



As an issuer, banks only constituted on average 6% of the outstanding amount of debt securities market. The major issuer of debt securities is the Government of Malaysia which issued on average 43% of outstanding amount. The significant amount of government-issued debt securities are used to finance fiscal policies and they serve as benchmarking purposes in the development of the debt securities market in Malaysia.

In terms of derivatives, Malaysian banks are also quite active. Between 2008 to 2009 there were on average RM1,256b notional amount of derivatives in banks. Out of this, interest-rate-related derivatives constitute the highest portion with RM755b, while FX-related derivatives was second with RM430b. The notional value of derivatives stood at RM1,094b as at June 2009.

1.2 Characteristics of Malaysian Financial Institutions

The banking sector in Malaysia consists of conventional and Islamic commercial banks and investment banks. There are currently 54 banks operating in Malaysia. These banks can be classified into the following groups:

i. Large Domestically-owned Commercial Banks (DCB): 9 Entities

Domestically-owned banks went through a few rounds of merger-and- acquisition exercise under Bank Negara Malaysia (BNM)'s 2000 to 2010 Financial Sector Master Plan (FSMP) to form 9 conglomerates.

ii. Locally-incorporated Foreign Commercial Banks (LIFB): 13 Entities

Foreign banks in Malaysia can be divided into two groups. The first group of LIFB are retail players which have huge core-banking base (i.e. they solicit deposits and issue loans) while second group opt for niche business mostly in treasury-based and trade-related activities, such as proprietary treasury activities, serving Multinational Companies (MNCs), treasury transactions and cash management services.

ii. Investment Banks (InvB): 15 Entities

Former merchant banks and universal brokers anchored the transformation of discount houses into investment banks. Eight of these banks are either subsidiaries of DCB, or a part of the same banking group as DCB, while the rest are on standalone basis. In terms of business model, most of the investment banks are relying on interbank borrowings, especially from their group to support their business, while those without banking group have sizeable corporate deposits to fund their assets. Although these standalone investment banks rely heavily on corporate deposits to fund their assets, the tenors between assets and liabilities are usually matched. The regulatory and supervisory approaches to InvB are as rigorous as those applied to commercial banks, with two notable differences. The first difference is, InvB are regulated

and supervised by both BNM and the Securities Commission with clear accountabilities to minimise regulatory gaps and overlaps. The Securities Commission is responsible for InvBs' business and market conduct in order to promote market integrity and investor protection in the capital market, while BNM is responsible for InvB prudential regulation. The second notable difference is, InvB are only allowed to accept deposits of a minimum of RM500,000. No similar limitation is imposed on commercial banks.

iv. Islamic Banks (IB): 17 Entities

The earliest form of Islamic banking in Malaysia may be traced back to September 1963 when Perbadanan Wang Simpanan Bakal-Bakal Haji (PWSBH) was set up. PWSBH was set up as an institution for Muslims to save for their Hajj (pilgrimage to Mecca) expenses. In 1969, PWSBH merged with Pejabat Urusan Haji to form Lembaga Urusan dan Tabung Haji (now known as Lembaga Tabung Haji). The first Islamic bank in Malaysia was established in 1983. In 1993, commercial banks, merchant banks and finance companies were allowed to offer Islamic banking products and services under the Islamic Banking Scheme (IBS). These institutions, however, are required to separate the funds and activities of Islamic banking transactions from that of the conventional banking business to ensure that there would not be any co-mingling of funds. In Malaysia, the National Syariah Advisory Council additionally set up at Bank Negara Malaysia (BNM) advises BNM on the Shariah aspects of the operations of these institutions, as well as on their products and services. Since the launch of FSMP in 2000, the number of IBs grew exponentially to its current state. About 9 of these banks are either sister companies or subsidiaries of DCBs, while 6 are foreign-based IBs. In terms of business model, these IBs follow a similar model as commercial banks except their products have to be Shariah-compliant.

1.3 Nature of Banks' Business

As can be seen from Figure 2, as at end of June 2009, deposits remained a major source of funding for all banks.

Figure 2
Sources of Bank Funds

Source of funding	RM Account (%)			
	DCB	LIFB	InvB	IB
Corporate Deposits	29.87	34.27	37.35	60.58
Retail Deposits	40.59	45.96	0.30	16.56
Short term Deposits	16.34	8.62	27.70	2.22
Issuance of papers and Securitisation*	3.63	1.25	1.10	1.28
NIDs and BAs	7.80	3.38	7.77	15.75
Interbank borrowings	1.78	6.53	12.85	3.51
Interbank repos	0	0	0	0.10

Note: *Funding via issuance of papers such as securities with or without recourse

DCB and LIFB have the largest component of stable funding in the form of retail deposits. For InvB and IB, their main funding is mainly from corporate deposits which are normally more volatile than retail deposits. In terms of dependency on wholesale borrowings, InvBs' interbank borrowings as well as LIFBs' funding vide swap lines are also significant. The main reason why InvB have less composition in deposits is mainly due to the regulatory requirement which permits them to accept only deposits of minimum of RM500,000.

The uses of the funding for each group of banks are presented in the Figure 3 below.

Figure 3
Uses of Bank Funds

Use of funding	RM Account (%)			
	DCB	LIFB	InvB	IB
Issuance of loans	66.00	54.67	8.04	55.73
Subscriptions of debt securities	18.93	19.18	61.49	17.57
Subscriptions of equities	0	0	0.52	0
Reverse repos*	0.65	6.54	2.80	0
Interbank lendings	13.05	18.91	25.84	25.78
Cash	0.77	0.26	0.92	0.37
Reserve	0.60	0.44	0.39	0.56

Note: * Securities allowed under reverse repo include Private Debt Securities (PDS), BAs, NCDs and Other Securities, as maybe specified by BNM.

Issuance of loans and subscription of debt securities stood out as the main usage of funds for all banks (except InvB with regard to issuance of loans). The operations of InvB are mainly fee-based, which explains for their low composition of loans issuance. The main reasons for the significant level of debt securities subscriptions are:

- i. For purposes of liquidity management;
- ii. To benefit from Statutory Reserve Requirements (SRR) exemption;
- iii. To be used as collateral for daily emergency liquidity acquired from the Central Bank;
- iv. As a result of underwriting activities (mainly InvB); and
- v. As a result of banks' role as Principal Dealers.

The detailed composition of securities held by banks as at June 2009 is presented in Figure 4 below.

Figure 4
Composition of Securities Held by Banks

Securities held by Banks	RM Account (%)			
	DCB	LIFB	InvB	IB
NIDs	23.05	12.88	11.91	12.85
Unit trust	3.84	0.00	0.43	1.34
Government	30.31	64.85	23.42	34.97
BNM	4.56	11.49	2.94	4.31
Khazanah	0.32	0.55	0.80	4.12
Danaharta	0.84	0.00	0.00	0.00
Cagamas	1.65	2.58	2.69	2.88
Private debt securities	26.16	3.66	45.95	35.75
Residential mortgage-backed securities	0.88	0.53	1.39	0.84
Other securities	1.63	0.98	2.32	0.22

As shown above, LIFB holdings of securities are concentrated in government securities, which are actively traded. This is followed by IB. A significant composition of DCBs', InvBs' and IBs' securities is private debt securities (PDS) which would expose them to both credit and market liquidity risks under the current economy.

In terms of loan-to-deposit (LD) ratios, as at June 2009, DCBs', LIFBs', InvBs' and IBs' LD stood at 86.91%, 75.23%, 12.47% and 81.25%, respectively. It is intuitive that InvB have a low LD ratio as their main business activity is not issuance of loans.

1.4 Characteristics of Government Bond Market

There are two types of government bonds in Malaysia. The first is a conventional-based government bond known as "Malaysian Government Securities" (MGS) while the second represents an Islamic-based government bond called "Government Investment Issue" (GII). As at June 2009, DCB are the main holders of MGS, with an average of RM22.4b, and are followed by LIFB which hold on average RM19.8b. In terms of the top three banks, the biggest holder of MGS came from the DCB group where on average this bank held RM9.6b worth of MGS. The 2nd and 3rd placing go to banks in LIFB group, with holdings of RM5.5b

and RM4.9b, respectively. In terms of GII, IB are the biggest holders, with an average of RM7b, and they are followed by DCB which hold RM6.6b. The bank with the highest holding of GII is the same bank with the highest holding of MGS, with an average holding of RM5.4b. This is followed by two Islamic banks with holdings of RM2.4b and RM1.4b.

The Principal Dealership system was introduced since 1989. Under this system, Bank Negara Malaysia appoints on an annual basis selected banking institutions as Principal Dealers (PDs) based on a set of criteria, including their capabilities to handle large volume transactions as measured by their shareholders' fund, their secondary market trading volume and the overall risk management capabilities. The PDs are obliged to participate actively in the primary and secondary market, to bid for at least 8.5% (Conventional PD's) and 4% (Islamic PD's) of the instruments specified in the primary auction (MGS, GII, MTB, MITB) and to provide reasonable two-way price quotations under all market conditions in order to ensure liquidity in the secondary market. In addition, the PDs are also required to assume the following responsibilities:

- Bid for MGS papers on behalf of clients for primary issues;
- Intervene on behalf of Bank Negara Malaysia when needed;
- Bid at least 10% in money-market tender or repo auction conducted by Bank Negara Malaysia; and
- Maintain minimum 2.5% share of secondary traded volume.

In return, to reward the PDs for greater responsibilities entrusted upon them, they were granted certain privileges, such as:

Allowed to be borrower or lender under Securities Borrowing and Lending Guidelines;

- Able to net off actual holdings of securities from Eligible Liabilities³ base;
- Able to on-sell securities received via reverse repo for purpose of market-making and hedging activities; and
- Allowed to amend customer bids submitted in primary issuance.

3. Eligible liabilities form the basis for calculating Statutory Reserve Requirement (SRR).

With the PD system in place, secondary trading in the bond market has improved significantly. As at February 2007, there were 10 principal dealers in the government securities market. In July 2009, the PD system was increased to 12 principal dealers for the conventional market and 6 principal dealers were for the Islamic market.

1.5 Regulations and Restrictions Regarding Banks’ Business Activities

Under the Banking and Financial Institution Act (BAFIA), 1989, specific regulations were issued by BNM defining the scope of activities each group of banks are allowed to undertake (see Figure 5).

Figure 5
Scope of Activities of the Banking Groups

Banking Group	List of Banking Activities						
	Deposits	Lending	Guarantees	Treasury	Forex	Derivatives	Other
DCB and LIFB	Yes. In the form of current, fixed deposit, savings accounts. No Limit.	Yes. In the form of term, revolving, trade finance, overdraft, housing loans and hire purchase.	Provision of financial guarantees to any persons.	Yes.	Yes, including Gold.	Yes, but subject to compliance with Bank’s guidelines.	i. Paying or collecting cheques. ii. Factoring. iii. Leasing. iv. Money remittance. v. Agents of unit trust of property trust and insurance. vi. Ancillary services. vii. Safe deposit box facilities and intermediation role.
InvB	Yes. Fixed deposit account only at minimum RM500k.	Yes, but only to complement fee- based activities.	Provision of financial guarantees to any person.	Yes.	Yes, excluding Gold.	Yes, but subject to compliance with Bank’s guidelines.	i. Consultancy and advisory services relating to corporate and investment matters. ii. Business of making or managing investment on behalf. iii. Securities. iv. Future broking. v. Fund management. vi. Unit trust schemes.
IBs	Similar to DCBs and LIFBs with additional feature of having to obtain Syariah Council approvals for all transactions.						

2. The Role of Central Bank

2.1 As Liquidity Provider

The role of BNM in providing or withdrawing liquidity stems from its objectives of achieving monetary and financial stability. The ultimate goal of monetary stability is to achieve price stability in order to manage inflation and the economy. This is done by influencing the level of interest rates and management of liquidity in the banking system. For example, when the economy is weak, liquidity would be injected into the banking system and interest rates lowered in order to boost consumption and investment to stimulate the economy.

Financial stability, on the other hand, refers to an environment where financial institutions licensed and supervised by BNM remain strong in terms of liquidity and continue to meet their contractual obligations. BNM acts as financial regulator and supervisor as well as lender of last resort in order to ensure the financial institutions remain solvent and are capable of meeting their liquidity responsibilities.

There are a few methods used by BNM to inject or mop up liquidity. They include sale and purchase of BNM and Malaysian Government papers and other eligible securities under REPO agreement, changes in the statutory reserve requirement (SRR), and direct lending and borrowing in the interbank market. These methods may be used by BNM in normal time or during a crisis.

A classic REPO arrangement is where the seller of REPO requires cash and sells to REPO buyer a security with a commitment to repurchase the said security. Under REPO agreements, BNM would withdraw liquidity through the sale of eligible securities to the banking system and would repurchase these securities back in a future time. A reverse REPO would be used by BNM in order to provide liquidity vide purchasing eligible securities from the banking system.

SRR is the required reserve that banks in Malaysia must maintain as a percentage of Eligible Liabilities (EL) in order to manage liquidity. In using SRR to inject and mop up liquidity, BNM relaxes or makes more stringent some of the requirements under this guideline. For example, under the guidelines issued in 2007, EL was originally defined as MYR (Malaysia Domestic Currency) denominated liabilities net of interbank assets and placements with BNM. Furthermore, between 2008 and 2009

BNM made 3 downward revisions of SRR ratios from 3.5% to 1%. The last revision to SRR ratio prior to 2008 was in September 1998 where the SRR rate was 4% of EL.

The last method that could be employed by BNM to provide liquidity is to directly lend and borrow in the interbank market. BNM drew up extra tools to manage liquidity in the banking system to allow it to influence interest rates in the interbank market which came in the form of “New Interest Rate Framework” guideline. The guideline gives BNM the power to set overnight rate known as Overnight Policy Rates (OPR). The OPR, in turn, is a guide for banks to set their overnight interbank rate. BNM also stipulates, under the same guideline, that banks’ overnight interbank rates should be within the operating corridor as specified by BNM. The current specified corridor is within (-25bps+25bps) of the OPR. The guideline makes available Standing Facilities (SF) for the banking and insurance systems in the event they are faced with liquidity problems under normal or crisis scenarios. The SF includes Lending and Deposits facilities which are priced at ceiling limit for Lending and floor limit for Deposits. However, as BNM is a lender of last resort, banks are required to go through the interbank market first before resorting to borrowing from the central bank.

2.2 As Financial Regulator

One of the fundamental roles of BNM is to develop a sound banking system that is responsive to the changing needs of the economy and society, enabling strong and resilient financial players and a well-functioning financial market. Liquidity management in the banking system is one of the most important aspects of banks’ activities that is closely regulated and supervised by BNM.

The regulatory arm of BNM had introduced several important guidelines in order to ensure that banks perform their liquidity management in a manner that would safeguard their depositors and ensure that banks’ obligations would always be met. The guidelines include, among others, “The New Liquidity Framework (NLF)”. As part of the additional measures to safeguard customer deposits, the deposit insurance system via Malaysian Deposit Insurance Corporation (MDIC) to promote confidence in the banking system and to avert runs on individual banking institutions especially during a crisis.

The NLF was first issued in 1998 to replace the Liquid Asset Ratio (LAR) requirement. The framework was established to:

- i. Create awareness among banking institutions of their funding structure and their ability to handle short- to medium-term liquidity problems;
- ii. Adopt a more efficient and on-going liquidity measurement and management for banking institutions; and
- iii. Provide the central bank with a better means of assessing present and future liquidity position of the banking institutions.

The framework aims to address both institutional and market liquidity concerns:

- i. The ability of banking institutions to meet all maturing obligations is assessed through the projection of banking institutions' inflows, and
- ii. The framework gauges the ability of banking institutions to access funding from the market particularly under stress scenarios.

One of the main weaknesses found from specifying LAR alone was some banks had more than enough liquefiable asset than they actually needed, while others did not have enough liquid assets to cover their liquidity obligations. The other major weakness was LAR only addressed sufficiency of liquid assets to meet short-term liquidity needs but did not address longer-term structural liquidity mismatches. Since 1998 additional refinements were made to the framework in 1999, 2004 and 2007. The NLF was again fine-tuned in 2009 to ensure that the NLF is up to date with the Bank of International Settlement (BIS) recommendations on liquidity risk measurement and management.

The SRR came into force since 1959. Since its enforcement the SRR has been revised several times. The SRR has been dropping since 1996 to its current state of 1%.

The supervisory departments of BNM also play important roles in banks' liquidity management as they have to ensure banks comply with the minimum requirements as issued by the regulatory arms as well as assessing whether the complexity of banks' products was complemented with strong liquidity measurement and management practices. In this sense, the supervisory departments had recognised the Asset and Liability Management (ALM) of banks as a significant activity under their Risk-based Supervision Framework (RBSF) which needs to be periodically monitored and assessed.

2.3 Central Bank's Requirement and/or Recommendations Regarding Banks' Liquidity Measurement and Management

As mentioned above, liquidity measurement and management are mainly governed by the NLF and SRR requirements. These guidelines propose at minimum how liquidity risk is to be measured and managed.

Under the NLF, banks are required to submit prescribed information on a monthly basis. Liquidity risk is measured via the use of cash-flow maturity mismatch where assets and liabilities, both ON and OFF balance sheets, are projected from 1 week up to above 1 year from the current position. These maturities are divided into 6 buckets: namely, up to 1 week (for InvB, up to 3 days), 1 week to 1 month (for InvB, 3 days to 1 month), 1 to 3 months, 3 to 6 months, 6 to 12 months, and above 1 year. In the NLF, banking institutions are required to allocate their asset and liabilities based on their contractual and behavioural maturities. Both are reported in NLF submissions. Contractual maturity is based on the actual maturity agreed in the contract, i.e. a 1-month Fixed Deposits (FD) would be slotted either in the 1 week to 1 month bucket, if the remaining maturity of the deposit is 1 month, while behavioural maturity is the maturity based on the behaviour of the assets or liabilities. An example of behavioural assumption is, if the 1-month FD mentioned under contractual maturities is rolled over for a period up to 6 months, the amount of the FD may be slotted in the 3 to 6 months bucket. In terms of behavioural maturity methodology, the NLF prescribes a set of benchmark treatments. If banks chose to differ from these benchmark treatments, banks have to satisfy BNM on the robustness of their methods in producing the behavioural maturity.

Banks are required to manage and ensure that the short-term liquidity obligations, i.e. up to 1 week and 1 week to 1 month maturity buckets, are adequately satisfied under normal course of business (level 1) as well as under withdrawal shock scenarios (level 2). How this work is,

under the normal course of business, the on- and off-balance-sheet assets maturing in the two shortest maturity buckets are compared with on- and off-balance-sheet liabilities of the same maturity tenures. The shortfall or surplus from these two maturity buckets is then added with withdrawal shocks of 3% and 5% of total deposits respectively. The new shortfall or surplus is then compared with the liquefiable assets and available credit lines to see the overall result. If the bank faces a shortfall, they have to rectify the situation soonest possible to ensure the overall results are always surplus to comply with the framework.

To ensure that the determination of liquefiable assets is on a more consistent and objective manner, a set of “qualifying characteristics” for the recognition of liquefiable assets has been identified under the NLF. The qualifying characteristics for liquefiable assets are as follows:

- i. Assets easily convertible in large sums into cash at short notice;
- ii. Low counter-party credit risks;
- iii. Free from any encumbrances that restricts its sale or repo capability; and
- iv. Have sufficiently deep secondary market or repo market which continue to exist during tight liquidity situations, or which the Central Bank of Malaysia is prepared to purchase, lend or allowed for repo in the course of its money market or liquidity support operation

In order to factor in market movements in the framework, liquefiable assets used to meet the shortfall after withdrawal shocks are valued using yield slippages. The more risky the assets the higher the yield slippage, i.e. government-issued bonds are given 2% yield slippage, while PDS are given 10%.

Apart from monitoring the overall mismatches in the 1st and 2nd maturity buckets, the framework also requires banks to calculate and monitor a series of broad ratios which indicate the bank’s dependency on a certain funding source. The ratios cover dependency on large customer deposits, interbank markets and offshore market. Any banks found to be over-reliant on a certain funding source would be asked to submit plans to diversify their funding source.

In terms of SRR, banks are required to maintain 1% of eligible liabilities (EL), as at June 2009. The SRR has two levels both of which are required to be complied by banks. The first level deals with how banks are to calculate the balances in their Statutory Reserve Account. Banks are required to observe the average daily amount of EL over two fortnightly periods. EL Period A is average daily EL between 1st and 15th (inclusive) while period B is average daily EL between 16th and last day of the month (inclusive). In coming up with EL of each period, banks are prohibited from offsetting negative daily EL with positive ones. All negative daily EL should be zeroised. Banks have to maintain average reserve balance for 1st and 15th day of any month equivalent to 1% of EL Period A of the preceding month while the rest of the days in the month would be 1% of EL Period B of the preceding month. Under the second level, banks are required to maintain in the balances in the Statutory Reserve Account within 20% daily variation band around the prevailing policy rate. What this means is, as current prevailing rate is 1%, Malaysian banks have to maintain daily balances in the band of between 0.8% and 1.2%. Balances below the band are not permitted while balances in excess of the band's ceiling will not be recognised in meeting the average fortnightly requirement as EL.

As of 1st September 2007, the EL base consists of ringgit-denominated deposits and non-deposits liabilities, net of interbank assets and placements with BNM. However, a revised guideline issued in March 2009, have allowed banks to make additional adjustments to their EL base. Banks are also allowed to deduct ringgit marketable securities held in their trading book provided banks' Trading Book Policy Statement (TBPS) have been approved by BNM. Principal Dealers meanwhile are allowed to deduct specified securities in their trading and banking books as well as ringgit marketable securities which are not specified in their trading book.

2.4 Collateral Criteria for Borrowing from Central Bank

Under the Standing Facilities prescribed by BNM in the "New Interest Rate Framework," banks are allowed to borrow from BNM using the Lending facility to obtain overnight liquidity. This could be done in two forms which are repurchase agreements (REPO) and Collateralised Loans against eligible collaterals. The eligible collaterals include MGS, Treasury bills, GII, BNM Bills, BNM Negotiable Notes, quasi- government securities⁴ and other securities that maybe specified by BNM. The net

4. Quasi-government securities: Securities issued by four recognised government-linked institutions, namely, Cagamas, Khazanah, Danaharta and Danamodal.

price of the eligible collaterals is based on appropriate margin specified by BNM. For government-, government-guaranteed- and BNM-securities the margin ranges between 0.5% and 6.5%, while other securities are between 0.8% and 10.0%. BNM reserves the right to change the margin applied in order to reflect current market conditions. With regard to the legal ownership of the asset under the lending facility, for overnight repurchase agreements, the ownership of the asset is transferred to BNM. For overnight collateralised loans, an enforceable security interest is provided over the asset while ownership of the asset retains with the bank. Interest rate is charged as fixed interest rate, based on ceiling limit and calculated using simple interest rate with day-count convention of “actual/365”. Upon the announcement of new OPR (Overnight Policy Rate as set by BNM), a new ceiling rate will be effective accordingly.

3. Dynamics and Determinants of Liquidity in Malaysian Financial System

3.1 Liquidity Profile in the Financial System

Liquidity in Malaysian financial institutions, in particular in the banking sector, remains ample in 2009. This is based on a significant liquidity surplus, healthy loan-to-deposit (LD) ratio, large depositors’ base, and minimal reliance on known volatile sources of funding.

As at end of June, the liquidity surplus of Malaysian banks in the first two maturity buckets⁵ stood at RM225b. This amount represents 1.55 times deposits maturing within 1 month and 24.84% of banks’ total deposits. The surplus is also enough to meet the off-balance sheet (OBS) obligations maturing in 1 month as the surplus is 1.53 times the OBS and almost enough to cover the on-balance sheet liabilities maturing in 1 month as it is 91% of the liabilities.

Loan-to-deposit (LD) ratio and number of depositors are also at healthy levels. LD ratio as at end of June 09 stood at 81.43%. This ratio shows that banks do not have to rely on interbank borrowing to fund their loans as they have sufficient deposit base. Banks are also not concentrated on large depositors and have a broad base of depositors.

In terms of concentration in volatile sources of funding, such as offshore borrowings, interbank borrowings and short-term interbank

5. As defined by NLF: Maturing assets in 1 month minus maturing obligations in 1 month minus 8% total deposit withdrawal shock plus liquefiable assets.

borrowings, Malaysian banks have also managed to minimise such reliance. Offshore borrowings against total domestic funding were kept at 5.5%, while short-term interbank borrowings against total short-term funding were kept at 15%. Moreover, Malaysian banks are also net interbank lenders and, as such, they are not relying on interbank borrowings.

If we categorise banks into Domestic Commercial Banks (DCB), Locally- incorporated Foreign Banks (LIFB), Investment Banks (InvB) and Islamic Banks (IB), we see similar conclusions. The liquidity indicators as at 30 June 2009 for each category are summarised in the Figure 6.

Figure 6
Liquidity Indicators of Banks

Indicators	DCB	LIFB	InvB	IB
Liquidity Surplus up to 1 month	RM86.6b	RM71.8b	RM22.4b	RM44.7b
LD ratios	86.91%	71.58%	12.47%	81.25%
Average number of depositors with deposits > 1% of total deposits	7	12	34	13
Offshore borrowings / Total domestic funding	1.33%	12.4%	6.55%	1.87%
Short-term interbank borrowings / Total short-term funding	5.33%	32.31%	20.85%	3.28%

LIFB registered the highest short-term interbank borrowings/total short-term funding - the reason being that LIFB normally serve as MYR settlement banks for their member branches in the region. If member banks do not utilise MYR excess fund, the fund would normally be placed with their LIFB. These LIFB will then place the money out with BNM or other banks.

In terms of Foreign Currency (FCY), Malaysian banks have limited exposure as total FCY assets constitute less than 10% of total assets.

In terms of liquidity profile for Malaysian financial market, government-issued bonds revealed heightened market liquidity risk in 2009. One indicator, liquidity premium for the 3-, 5- and 10-year tenors were highest between November 2008 till June 2009, as compared with any other periods in the last 5 years, as Malaysia started to feel the impact of the sub-prime crisis as well as the collapse of Lehmann Brothers (refer to Figures 13a to 13c in pages 23-24 for details). Turnover ratio was also the smallest in 2009. Prior to 2009 the average turnover ratio registered above 1.4 times as compared with 2009 average ratio of 1.3 times.

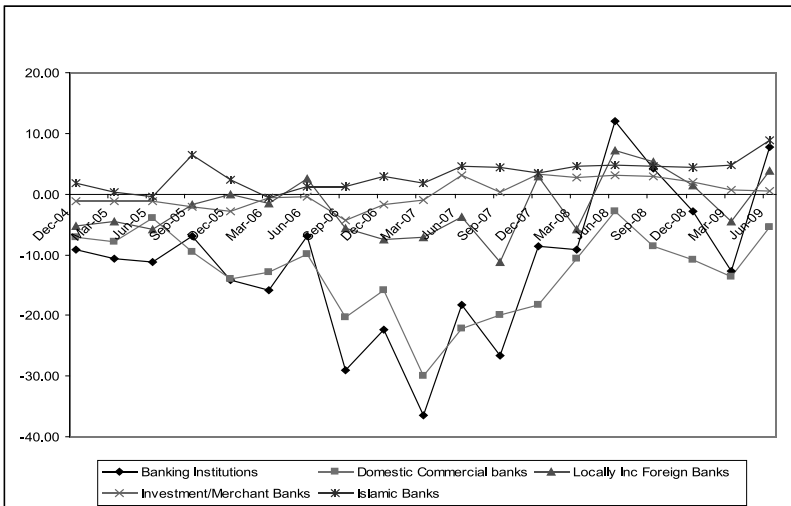
3.2 Development of Liquidity Indicators (Compared with Trend)

3.2.1 Funding Liquidity (Quarterly Data from 2005-2009)

Funding liquidity risk for Malaysian banks seems to be at its highest during the 2006 to 2007 period, while for InvB deposits, withdrawals grew higher after the collapse of Lehman Brothers. Nevertheless, although highest negative mismatches were seen during this period, Malaysian banks were still registering liquidity surplus in the range of 16.3% to 27.4% of total deposits.

Between 2006 to 2007, Malaysian banks experienced highest negative mismatch on the shortest maturity bucket, i.e. up to 3 days for investment banks and up to 1 week for the rest, indicating significant level of funding liquidity risk. The highest negative mismatch stood at RM36b. This was mainly coming from DCB as can be seen in Figure 7.

Figure 7
Trends of RM Account Maturity Gap for Shortest Maturity Bucket (RM'b)

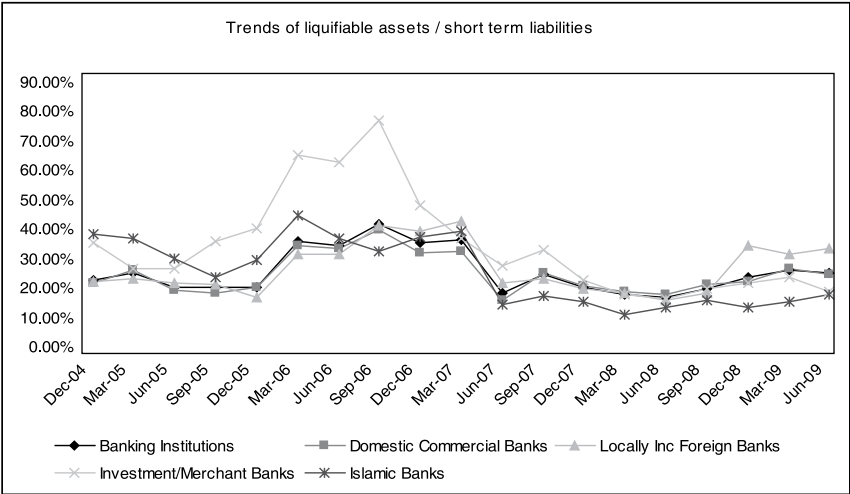


The negative mismatch came mainly from core banking business where repayments of loans in the shortest bucket were not enough to cover both on-balance sheet in the form of deposits maturing, and off-balance sheet in the form of undrawn loans, commitments and guarantees. Furthermore, banks during this period did not place significant amount of money sourced by their treasury department in the shortest maturity

bucket. The trend of negative mismatch started to decline since June 2007 as banks started to place short-term deposits sourced by their treasury with BNM. This placement with BNM allows banks to uplift early if they have liquidity needs.

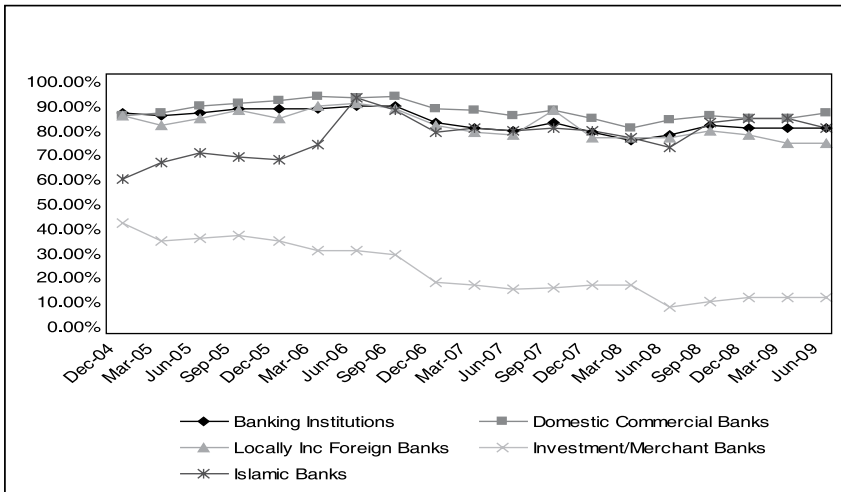
Although the negative mismatches during 2006 to 2007 were the highest, they were adequately met by the holding of liquefiable assets such that the banking industry was still registering liquidity surplus within the range of RM50b to RM93.4b. The surplus was in the range of 16.3% to 27.4% of total deposits. The percentage of liquefiable assets against short-term liabilities was also among the highest during this period as can be seen in Figure 8.

Figure 8
Trends of Liquefiable Assets/Short-term Liabilities



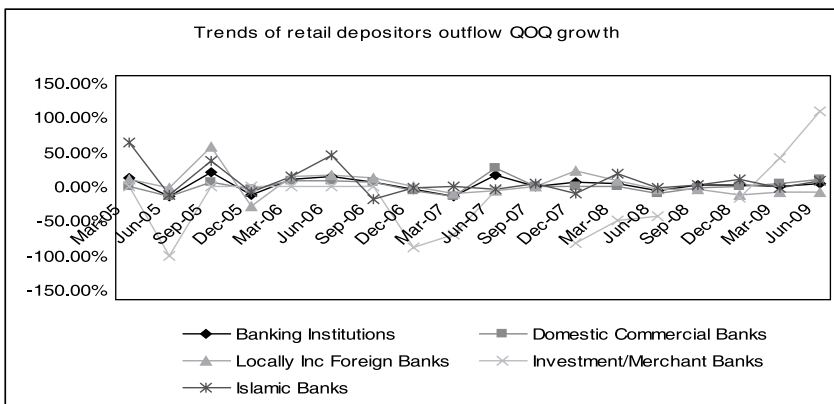
The trends of loan-to-deposit (LD) ratio also showed that they peaked during the period of 2006 to 2007, where the industry ratio stood at a maximum of 90%. The LD ratios during this period were mainly contributed by DCB, LIFB and IB where the highest recorded ratios were 94%, 91% and 93%, respectively (see Figure 9).

Figure 9
LD Ratio Trends



The quarter-on-quarter growth in retail deposit outflow meanwhile showed only InvB were facing dramatic growth during the 2009 quarters (see Figure 10 below). The likely cause for this is the efforts by the banking groups to consolidate and rationalise their business. Deposits held by corporate clients in these InvB were being transferred to their commercial/ Islamic banking operations within the same group. Moreover, the collapse of Lehman Brothers may have also unsettled these depositors.

Figure 10
Retail Depositors Outflow Quarter-on-Quarter Growth (QoQ)



In terms of concentrations under the shortest maturity bucket, interbank placements and deposits have the highest composition on average of 37% and 32%, respectively. The trends of interbank placements and deposits in the shortest term buckets are shown in the Figures 11 and 12.

Figure 11
Percentage of Interbank Placements in Shortest Maturity Bucket

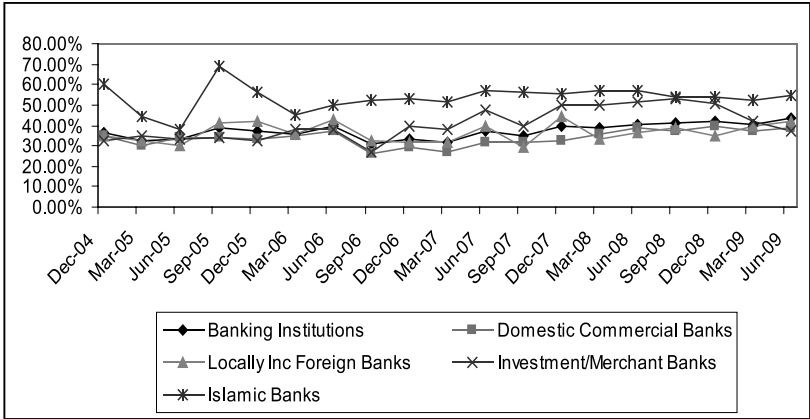
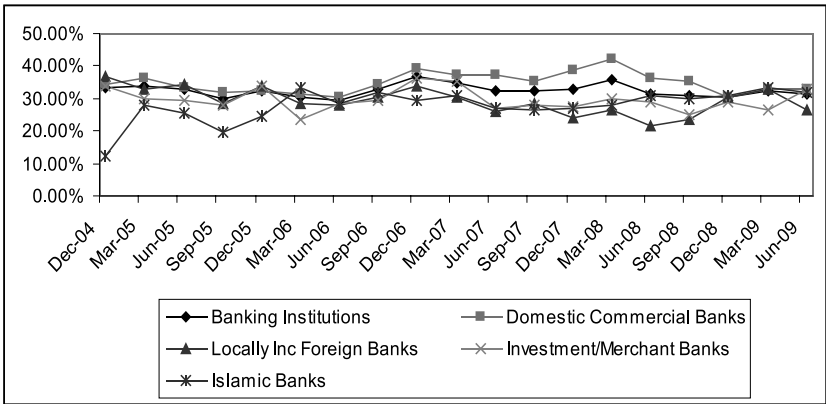


Figure 12
Percentage of Deposits in the Shortest Maturity Bucket



The above indicate that although banks in Malaysia may be exposed to short-term deposit outflow, there are enough assets to meet these outflows.

3.2.2 Market Liquidity (Monthly Data from 2005-2009)

Market liquidity indicators in Malaysia are still at an early stage of development where historical bid- and ask-quotes for MGS are still very limited. However, the Bond Pricing Agency of Malaysia has started collecting this information in 2009. Nonetheless, as the historical data prior to 2009 are unavailable, trend analysis would not be possible.

In terms of liquidity premium, the differences between MGS and PDS issued by corporates rated AAA to BBB were on an increasing trend since August 2006, with highest premium recorded between November 2008 to February 2009, as reflected in the Figures 13a, 13b and 13c.

Figure 13a
3-year Corporate-issued Securities Liquidity Premium

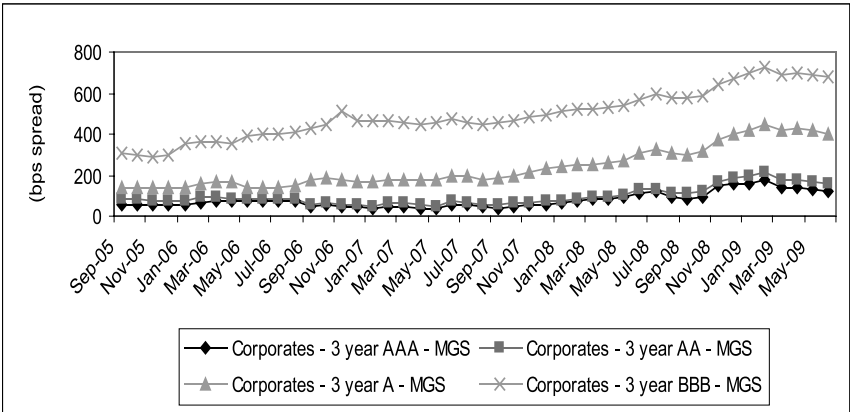


Figure 13b
5-year Corporate-issued Securities Liquidity Premium

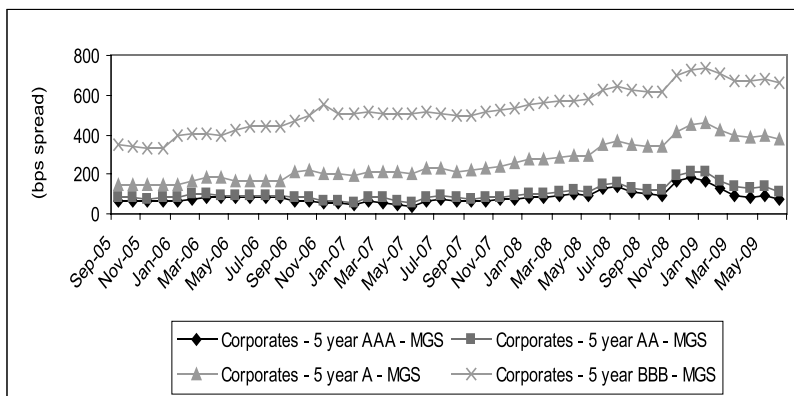
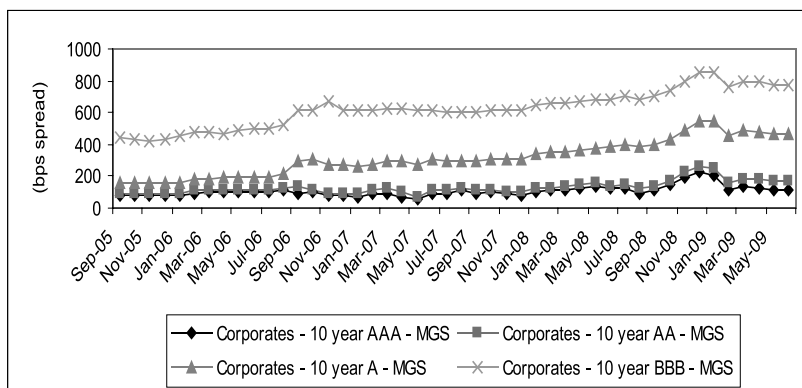


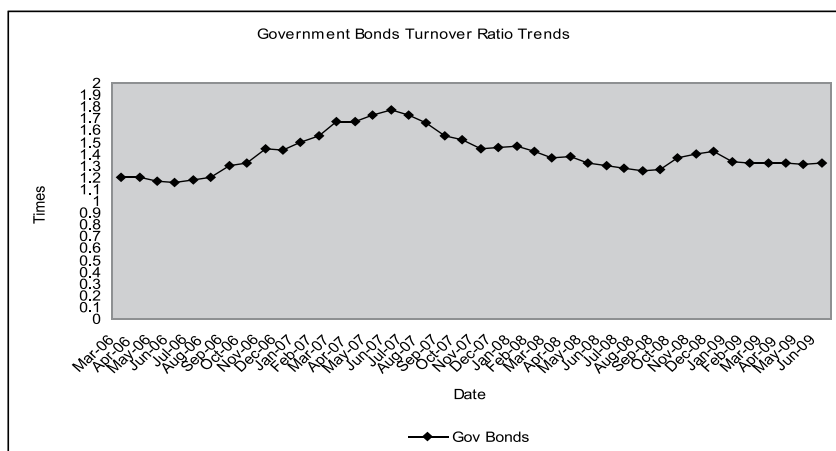
Figure 13c
10-year Corporate-issued Securities Liquidity Premium



The main reasons for the increase in liquidity premium were the upward revision of interest rates and investors' incorporation of inflation risk into PDS pricing.

The turnover ratio of government bonds, however, showed a declining trend with an average of 1.315 times in 2009, as compared with above 1.4 times prior to 2009, signaling heightened market liquidity risk in 2009. Spikes could be seen during the volatile periods, such as September 2006 to June 2007 (monetary policies were reviewed upward three times), and October to December 2008 (the collapse of Lehman Brothers). See the Figure 14 below for the trend of the turnover ratio of government bonds.

Figure 14
Government Bond Turnover Ratio



In terms of market depth, MGS has the highest depth when it is traded at yields of between 3.5% and 4.5%. Furthermore, highest depth could also be seen in the shorter- to medium-term tenors, i.e. tenors of 3 years or less. The summary of MGS highest depth against traded yield from 2005 to June 2009 is highlighted in Figure 15 below.

Figure 15
Maturity, Yield and Traded Amount of Malaysian Government Securities

Remaining maturity (year)	Yield range (%)	Traded amount (RM'mil)
Less than 1	3.55-3.8	48,164
1 to 3	3.55-3.8	62,587
3 to 5	3.55-3.8	27,742
5 to 10	4.05-4.30	37,740
Above 10	4.05-4.30	9,616

3.2.3 *Qualitative Data (Yearly Data and Information from 2005-2009)*

In terms of earnings, 2 out of 9 domestic commercial banks (DCB) registered losses during 2005 to 2009 period, while 1 DCB had a decreasing trend. For LIFB, no banks registered losses, while 7 out of 13 LIFB had decreasing trend of profit in 2007. 5 out of 16 InvB had registered losses between 2005 to 2009, while another 7 reported lower profits in 2008. IB, on the other hand, had 6 out of 17 banks registering losses, while a further

4 had decreasing profit trends. Non-Performing Loans (NPL) analysis revealed 2 banks from DCB, 5 LIFB, 6 InvB and 7 IB faced higher NPL in 2009.

Credit ratings between 2006 and 2009 saw 2 DCBs being upgraded by one notch while the rest had maintained their ratings since 2006. LIFB saw no movement in their credit ratings, while InvB and IB each had 1 bank-credit rating upgraded by 1 notch,

3.3 Factors Affecting Liquidity Risk in Malaysia

There are three main factors affecting liquidity in Malaysia. The first factor is a sudden rise in uncertainty caused by financial crisis. The Asian financial crisis during the period of 1997 to 1998 had caused 1 finance company to be placed under BNM receivership. The finance company was one of the top financial institutions in Malaysia. However, the company encountered about 20% NPL as a result of the crisis, causing many of its depositors to lose confidence in and withdraw from the company. BNM intervened and assumed control when the condition worsened.

The second factor that would affect liquidity in Malaysia is the change of monetary policy. Between 2005 and 2006 BNM had revised upwards its Overnight Policy Rate (OPR) three times to its highest level of 3.5%. This had caused the value of liquefiable assets to drop down and thus decrease liquidity surplus in banks. Between 2008 and 2009 the OPR was revised downward a number of times. This had caused the value of liquefiable assets to shoot up and increase liquidity surplus.

The third factor in Malaysia is the establishment of a deposit insurance scheme known as Malaysian Deposit Insurance Corporation (MDIC) in September 2005. Since its formation MDIC had further contributed to financial stability, especially among depositors guaranteed by them.

4. Current Practices in Liquidity Risk Management in Banking

There are a few tools banks in Malaysia use in managing liquidity during normal time. These tools are based on established organisational and industry practices published in the written papers. These papers identify weaknesses in industry practices and recommend improvements, while also identifying existing industry best practices. The following are some of the liquidity risk management practices observed in Malaysian banks. Practices may vary between different banking institutions.

All banks in Malaysia are subjected to the New Liquidity Framework (NLF) and in this guideline banks are required to have sufficient liquefiable assets to meet mismatch under normal business as usual plus total deposits withdrawal shock. As such a primary liquidity management tool in Malaysia is the strengthening of liquefiable assets and available credit lines held by banks.

On top of liquefiable assets and available credit lines, commercial banks in Malaysia would also ensure they are not exposed to unnecessary liquidity risk by employing Risk Diversification Plan. This plan covers minimally the following 3 areas:

- i. Diversification of Funding Sources and Instruments:**
Diversification of sources means taking money from as many different types of customers (individuals, SMEs, large corporations, etc.) in as many different industries as possible (insurance industry, petroleum industry or interbank market, etc.).

Diversity of instruments (CDs, Repos, BAs, CPs, securitised assets, etc.) is more attractive to investors and it enables the issuer to obtain additional funding and have more liquidity.
- ii. Market Share of Sources and Instruments**
Banks would ensure that they spread out the market shares of their funding sources and instruments so that they would not be caught in a liquidity squeeze from depending on 1 or 2 sources or instruments with 100% market shares.
- iii. Diversification by Maturities**
Banks are also managing proactively their funding source maturities to avoid concentration of maturities on a particular tenor.

In time of crisis banks are still expected to source their funding from the interbank market before resorting to the central bank as the lender of last resort.

There are not many differences between domestic banks and foreign commercial banks with regard to their liquidity management tools. An additional tool available to foreign commercial banks would be their ability to depend on their holding banks or their group for funding sources. However, domestic banks with large branches overseas would also be able to depend on this tool for liquidity management.

The contingency funding plan during crisis is predicated on these factors:

- i. Bank-specific factors: Most banks depend on their ability to liquidate liquefiable assets as well as depend on the interbank market in order to obtain the needed funding arising from bank-specific factors.
- ii. Systemic (economy-wide) factors: Most banks would depend on similar tools, i.e. liquefiable assets and interbank market. However, as the factors are economy-wide, higher yield slippage are assumed for liquefiable assets and dependency on interbank market would also be only with those they have good relationship with. On top of these two tools, banks would also include the central bank as lender of last resort as a part of their funding source.

In term of internal governance, it is a combination of the NLF with Basel principles. Under Basel principles, the Board of Directors (BOD) is responsible in establishing banks' liquidity risk tolerance. The BOD is also responsible for articulating the risk tolerance such that each entity in the bank is aware of the risk tolerance.

The Basel principles also specified that senior management is responsible in setting up strategies in order to ensure compliance towards banks' risk tolerance. Senior management is also responsible in ensuring that banks are able to measure and manage liquidity risk during business as usual as well as crisis situations. The following items should also be included in banks' liquidity risk management and measurement based on the Basel principles:

- i. Establish a process for the identification, measurement, monitoring and control of liquidity risk;

- ii. Consider limitations to transferability of liquidity across entities and currencies;
- iii. Diversify funding sources & tenors & manage market access;
- iv. Actively manage collateral & intraday liquidity positions;
- v. Conduct stress tests & utilise results to manage risk;
- vi. Maintain a cushion of unencumbered, highly liquid assets as insurance against stress scenarios; and
- vii. Establish contingency funding plans.

5. Lessons Learned in Malaysia

5.1 Trends in Liquidity Risk Management Practices Before and After the Recent Global Financial Crisis

Malaysian banks had been subjected to stringent regulations of liquidity risk since the Asian Financial crisis 1997-98. The NLF had outlined the requirements for banks to be able to project and meet present and future cash-flow requirements, withstand crisis, like deposit withdrawal shocks, and to have adequate liquefiable assets to buffer liquidity needs. However, the two areas which had seen significant improvements following the global financial crisis are: stress testing and contingency funding plans (CFP).

Arising from the crisis as well as from the BIS paper on liquidity management issued in September 2008, Malaysian banks have further improved on their stress-test process. Both market-wide and institution-specific scenarios are being developed in order to see whether banks are able to withstand such scenarios. Banks are also required to submit semi-annually the result of their stress testing to BNM. The central bank would review and comment on the suitability of the scenarios created as well as the severity of crisis as compared with banks size and complexity. Furthermore, banks are expected to produce policies and procedures in order to manage these stress scenarios should the events materialised.

Contingency funding plans are also being developed by banks in managing liquidity stress scenarios. Banks are using the BIS paper as a guide for preparing their CFP. Malaysian banks in their CFP are expected to prepare for funding sources for each stress event that they have developed as well as outlining step-by-step processes and plans in facing liquidity stress and officers responsible to execute them. There are also banks in Malaysia which have started to test the applicability of their CFP.

5.2 Role of Liquidity Risk in Triggering Past Financial Crisis, including Case Studies

In Malaysia, it is the global and regional financial crisis which had triggered liquidity risk, and not the other way around. One of the most outstanding cases which occurred in Malaysia was the takeover of MBf Finance Bhd (MBf) by BNM.

Until it ran into financial difficulties, MBf was an example of an ethnic-Chinese corporate dynasty. The company had a network of 120 branches with deposits totaling US\$4.49b. In his autobiography, the founder of the company declared that he was preparing to transform MBf into an international conglomerate which could take on the Fortune 500 companies that dominate world trade.

The Asian Financial crisis, however, punished MBf for investing in all the wrong industries. These included hotels, stock broking, property development and assembly of imported cars. Furthermore, MBf had also focused on loans to stock market investors and real estate buyers. More than 20% of MBf loans had turned bad. The situation was aggravated by the news about the poor health of the founder. These two situations led to withdrawal runs in many of MBf's 120 branches. Before the situation worsened, BNM stepped in and took over the management of MBf as a pre-emptive measure.

5.3 Development of Liquidity Situation (in Banking Sector) Before and After the Recent Financial Crisis

Liquidity in the Malaysian banking sector remained ample before and after the recent global financial crisis. This could be attributed to the predominantly deposit-based funding structure of the banks, including investment banks, significant portion of liquefiable assets to meet liquidity

needs, government blanket guarantee of deposits as well as continuous liquidity management by the Malaysian banks.

In terms of liquefiable assets, as at 30 June 2009, the proportion of liquefiable assets to short-term liabilities stood at 19.71%, while the proportion of Class 1 (mainly made up of Government- and BNM-issued papers) against Class 2 (which are made up of NIDs, BAs, PDS and Credit lines) was 76% to 24%. Apart from the healthy ratios the level of liquefiable assets also indicates the demand of Government- and BNM-issued papers would be sustainable, thus providing market liquidity to these papers.

Finally, liquidity management is a primary concern of all Malaysian banks. Accordingly, committees such as the Assets-Liabilities Committee or ALCO of the Malaysian banks would frequently monitor, discuss and manage the liquidity situations of their banks to ensure that the banks remain solvent and would be able to meet their obligations when they are due. Furthermore, with the constant development and improvement of stress testing and CFP processes, Malaysian banks are becoming better equipped to manage liquidity risk in the Malaysian banking system.

5.4 Future Prospects

The NLF issued by BNM deals mainly with the monitoring and managing of the funding liquidity risk. The only resemblance of market liquidity risk in the NLF is the use of yield slippage in valuing the liquefiable assets. The fix yield slippage does not leave any room for possibilities of higher decrease in value that banks may face under certain stress events where they have to force sell. As such BNM may want to issue a more dynamic minimum standard on monitoring, reporting and management of market liquidity risk. Such requirement would enhance banks' liquidity risk management.

Furthermore, as recommended in the consultative document on the International Framework for Liquidity Risk Measurement, Standards and Monitoring, issued by the Basel Committee of Banking Supervision (BCBS) on 17 December 2009, BNM may also want to consider:

1. Developing regulatory standards which promote both short-term and long-term resiliency towards liquidity risk. Currently, NLF deals mainly with short-term resiliency towards liquidity risk of banks.

2. Adopting the two ratios in the paper, i.e. Liquidity Coverage Ratio (LCR) which monitors short-term resiliency and Net Stable Funding Ratio (NSF) which monitors long-term resiliency. LCR identifies the amount of liquid assets an institution holds that can be used to offset the net cash outflows it would encounter under short-term scenarios specified by BNM. While NSF measures the amount of longer term, stable sources of funding employed by an institution relative to the liquidity profiles of the assets funded and potential contingent calls on funding liquidity arising from off-balance sheet commitments and obligations.
3. Adopting the set of common metrics recommended by BCBS in monitoring liquidity risk profiles of specified entity. This is to ensure consistency in the monitoring and supervising of banks with international presence.

6. Conclusion and Policy Recommendations

The liquidity of Malaysian banks remained ample before and after the global financial crisis. The significant holding of liquefiable assets, establishment of MDIC, government blanket guarantee on deposits, continuous liquidity management by the banks, constant supervision by BNM, evolution of liquidity risk measurement and management tools, as well as strong macroeconomic and trade fundamentals have all contributed to the state of liquidity in the country.

The above reflects the sophisticated and well supervised state of Malaysian banks in terms of the monitoring and managing of the funding liquidity risk. Malaysian banks have also shown great discipline and commitment in liquidity management by complementing the minimum requirements set out by the NLF with their own tools such Maximum Cash Outflow (MCO) as well as early warning system, just to name but a few. The level of understanding of liquidity risk by Supervisors from BNM and employees of the banks in Malaysia is generally good and continuous improvements could also be seen in the areas of stress testing and contingency funding plans.

In terms of policy recommendations, BNM may want to explore the possibility of improving its regulations and policies on market liquidity risk. This area still requires further enhancements in the Malaysian context as the current monitoring and management of market liquidity risk is in

the use of static yield slippages. A more dynamic measurement of market liquidity risk standards which caters for different stress scenarios or events should be developed as this would enhance liquidity risk management by allowing banks to monitor and project the impact on marketability of their liquefiable assets during stressed scenarios. Furthermore, BNM may also consider adopting the recommendation made by the BCBS in its paper issued on 17 December 2009. The paper proposes regulatory standards which promote resiliency towards liquidity risk on both short- and long-term basis. This monitored vide monitoring the Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSF). The paper also propagates the use of common metrics in monitoring liquidity risk to better supervise banks with international presence.

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LIQUIDITY MEASUREMENT AND MANAGEMENT IN MYANMAR

by May Toe Win¹

1. Introduction

Risk measurement and management is regarded as a key element of governance at the Central Bank with the underlying objectives of safeguarding the Bank's reputation and ensuring the safety and soundness of the Bank's operation. As a principle, the risk management framework is periodically reviewed to ensure that it remains effective in surfacing key risks of the bank and that appropriate processes and systems are implemented to manage these risks.

Since the current global financial crisis triggered by sub-prime mortgage loans has also made clear the importance of good risk-management practices and the potential challenges to sustainable growth and the resilience of financial institutions, risk measurement and management plays a vital role in maintaining the safety and soundness of banks.

Therefore, this paper aims to help people who are involved in striving for soundness of the financial sector understand the importance of risk measurement and management, not only for individual banks, but also for safeguarding stability of the financial system.

1.1 Overview of Financial System and Commercial Banking Industry in Myanmar

Following a change of government in 1988 and adoption of a market-oriented policy, the structure of the financial institutions was transformed by new bank laws passed in 1990, namely, the Central Bank of Myanmar Law, the Financial Institutions of Myanmar Law, and the Myanmar Agricultural and Rural Development Bank Law. The Central Bank of Myanmar Law defines the responsibilities and the authority of the Central Bank of Myanmar (CBM); the Financial Institutions of Myanmar Law defines the activities of banking institutions and is the legal basis for the establishment of private banks; and the Myanmar Agricultural and

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Rural Development Bank Law defines the activities of the state-owned Myanma Agricultural Development Bank (MADB). The structure of the Myanmar Financial System in the early 1990s comprised the banking and non-banking financial institutions.

1.2 Share of Banking Sector vs. Capital Market

As mentioned above, the financial system in Myanmar is strongly dominated by banks while the insurance sector and the securities market are relatively small. As of March 2008, total assets of the banking system stood at K1,956 billion (Figure 1). The banking sector consists of 31 institutions, of which 19 are local banks and 12 representative offices of foreign banks. The remaining players in the formal financial sector are the Myanma Small Loans Enterprise, the Myanma Insurance, and the Myanmar Securities Exchange Centre (MSEC). The MSEC was launched in April 1996, a joint venture between the Ministry of Finance and Revenue and the Japanese Daiwa Institute of Research. Generally, the MSEC's trading activities are low and investors hold the shares as another savings instrument. The securities sector is still in its infancy and currently there are only two companies listed at the MSEC: the Forest Products Joint Venture Corp (FPJV) engaging in timber extraction, saw-milling and wood-based production; and the Myanmar Citizens Bank Ltd (MCBL).

Figure 1
Size of Financial Sector (in Terms of Total Assets), March 2008

	Number of Institutions	Assets (Millions of Kyats)	Assets as Percent of GDP
Banks	32	1,956,157	8.62%
<i>of which:</i>			
State Banks	4	1,046,870	4.62%
Private Banks	15	909,287	4.01%
Small Loans Enterprise	1
Insurance Company	1	27,400	0.12%
Securities Exchange	1	36.4	0.00%

1.3 Characteristics of Banking Sector

At present, the banking sector comprises the Central Bank of Myanmar, 4 state-owned banks, 15 domestic private banks and 12 foreign bank representative offices. All state-owned banks and domestic banks are

commercial banks and foreign bank representative offices are allowed to deal in liaison business only.

The non-bank financial institutions include a state-owned insurance enterprise, a state-owned small-loans enterprise (the government pawn shop prior to 1992), a private-owned leasing company and one securities company. As the non-bank financial sector is relatively small, the development of banking sector has become significantly important for the mobilisation and allocation of financial resources and, thus, for economic development.

1.4 Nature of Bank’s Business

The state banks serve to the specialised needs of the economy as indicated by their names—Myanma Economic Bank (MEB), Myanma Foreign Trade Bank (MFTB), Myanma Investment and Commercial Bank (MICB), and Myanma Agricultural Development Bank (MADB). They are complex financial institutions, which combine banking with directed lending and other quasi-fiscal operations and, in some cases, certain central banking and treasury operations.

Figure 2
Nature of State Banks’ Business

Details	MEB	MFTB	MICB	MADB
Types of products and services	Savings, current, certificate of deposits, foreign banking, border trades.	Commercial foreign exchange transactions, deposits in foreign currencies, bills of exchange, travellers’ cheques, L/Cs, remittances, bank guarantees.	Open to both local and foreign investors, JV companies, local and foreign business enterprises. Savings deposit.	Institutional credit for small-scale farmers, bank loans to state-owned agriculture and livestock organisations, cooperatives, private persons, and farmers’ groups.

Since 1990, privately-owned domestic banks were granted licences to operate banking business under the Financial Institutions of Myanmar Law 1990. Currently, 15 domestic private banks are conducting domestic commercial banking services, which include accepting demand and saving deposits and extending loans. Private banks are neither permitted to open foreign currency accounts nor enter into correspondent banking relationships with foreign banks. The state banks totally dominate the branch network in the country. The Myanma Economic Bank alone has 325 branches while all private banks operate about 219 branches throughout the country as of end- December 2009.

1.4.1 The Major Uses and Sources of Funds of Domestic Private Banks and State- owned Banks

As of June 30, 2009, the major uses and sources of funds of domestic banks are shown as follows:

Figure 3
The Major Uses and Sources of Funds of Domestic Private Banks
as of June 30, 2009

Uses of Funds	%	Sources of Funds	%
Cash	20.87	Due to Banks	0.26
Due from Banks	1.61	Deposits	72.60
Loans	44.47	Bills Payable	9.43
Securities Purchased	27.70	Borrowing	0.02
Fixed Assets and Other Assets	5.09	Equities	9.80
Other uses of Funds	0.26	Other Sources of Fund	7.89
Total	100.00	Total	100.00

Figure 4
The Major Uses and Sources of Funds of State-owned Commercial
Banks as of March 31, 2009

Uses of Funds	%	Sources of Funds	%
Cash	62.19	Other sources of funds	7.29
Bills Purchased and Discounted	0.05	Deposits	88.67
Loans and Advances	16.52	Bills Payable	2.57
Other Investment (including T/Bill)	15.12	Borrowing	0.93
Fixed Assets and Other Assets	6.12	Equities	0.55
Total	100.00	Total	100.00

Figure 5
Share of Deposit-taking Activities to Non-deposit-taking Activities,
June 2008

Activities	Amount (in million of kyats)	Percentage
Deposit of customers other than banks	777171.07	
Due to domestics banks	1935.77	
Share of deposit-taking activities	779106.84	79.71
Borrowing from MEB	800.00	
Borrowing from CBM		
Investment in T/Bonds	191950.00	
Investment in Bills	5548.68	
Share of non-deposit-taking activities	197498.68	20.29

1.5 Characteristics of Government Bond Markets

The primary bond market first developed in 1993, as the CBM issued, 3- years and 5- years treasury bonds currently yielding 11-11.5%. Both private individuals as well as domestic investors can purchase the bonds, at anytime, directly from the Central Bank or through the MSEC. The issuance of treasury bonds increased gradually till to 2002. During the fiscal years of 2002-2003 and 2003-2004, the sales of treasury bonds slowed down due to the capability of the private banks who are the major investors. After the fiscal year of 2003-2004, almost all the commercial banks have returned to stable condition and are operating banking business in full swing, the sale of Government Treasury Bonds have drastically increased again.

Like in the other transitional economies, the government of the Union of Myanmar plays a leading role in building economic infrastructure. In pursuit of infrastructure development, the government spending has been huge and on the increase in recent years. While the tax policy is based on easing measures in encouraging the private sector, the government has to rely partly on the issuance of treasury bonds to finance its budget deficit.

Myanmar Securities Exchange Center (MSEC) has also maintained a trading market for seasoned bonds on the OTC market.

At the moment, in the primary market, the methods of underwriting by a syndicate and public offering via auctions cannot be applied in the issuance of Treasury bonds. Individual bond holders have ready access to the MSEC's OTC market.

1.5.1 Share of Government Bond in Total Bond Outstanding

The government treasury bond is the only investment vehicle in the Myanmar bond market, there are no other investment instruments in Myanmar Bond Market. Which is why, the total bond outstanding is equal to total government bond outstanding at K349,857.55 million as of June 30, 2009. The three largest bond purchasers are private banks and their shares in total bond outstanding as of June 30, 2009, are shown in Figure 6 below.

Figure 6
The Largest Bond Purchasers and their Shares in Total Bond Outstanding as at June 30, 2009

Name of banks	Amount of Bond purchased (kyat in million)	Share (%)
Kanbawza Bank	100,000.00	29.65
Myawaddy Bank	75,300.00	22.33
Myanma Livestock and Fisheries Development Bank	43,000.00	12.75
Remaining 12 banks	118,950.00	35.27
Total	337,250.00	100.00

1.5.2 Use of Primary Dealers and Its Effects on Liquidity Distribution in Government Bond Market

Private banks are the major investors. Since the Central Bank allowed the private banks to maintain treasury bonds as part of their reserve requirements, the private banks buy a lot of Treasury Bonds to maintain strong liquidity position. In the Myanmar financial market, most of the financial institutions are commercial banks, and the number of long-term institutional investors are limited.

1.6 Regulations and Restrictions Regarding Bank's Business Activities

The Central Bank of Myanmar attaches considerable importance to prudential regulations. The elements of the prudential and supervisory regulation are:

- **A reserve requirement** of 10% of total deposits is required to be maintained by each bank;
- **A liquidity ratio** of 20% is required;
- A 10% **risk-weighted capital-adequacy ratio**;
- A **general provision** of 2% of outstanding loans, and **loan loss provisions** of 50% and 100% of the stock of doubtful and bad loans, respectively;
- A **lending limit** to a single client of 20% of bank's capital and reserve; and
- Non-performing loans are classified as either **“substandard”**, **“doubtful”**, or **“bad”** when principal or interest are overdue 6 to 12 months, 12 to 24 months, or above 24 months, respectively.

On-site inspections by the CBM are conducted annually to assess the banks' internal control systems, evaluate their financial soundness and check their compliance with relevant regulations. Off-site supervision involves the review of statistical returns submitted by the banks and dialogue with the banks' management. A comprehensive system of reporting is in place for verifying banks' compliance with reserve, minimum liquidity, capital adequacy and loan provisioning requirement.

2. The Role of the Central Bank of Myanmar

2.1 Acting as Liquidity Provider and Financial Regulator

The Central Bank of Myanmar (CBM) was established in February 1948 under the Union Bank of Burma (Myanmar) Act of 1947. The Bank is now governed by the CBM Law that was enacted in 1990 and which confers upon the Central Bank broad powers to operate with relative

independence and to exercise regulatory and supervisory authority over a wide range of financial institutions, both state and privately owned.

The CBM is responsible for acting as adviser to the government on economic matters; issuance of currency and securities; acting as a banker to the government as well as to financial institutions; formulating and implementing monetary policy; managing the international reserves of the State; controlling foreign exchange transactions; and licensing, inspecting, supervising and regulating financial institutions.

In accordance with the Central Bank of Myanmar Law (Section 57) and the Financial Institutions of Myanmar Law (Section 48), the Central Bank is authorised to inspect, supervise and regulate banks and financial institutions. The Central Bank's two departments, namely, the Bank Supervision Department and the Bank Regulation Department conduct supervisory and regulatory functions according to the core principles of the Basel Accord. The Bank Supervision Department conducts regular off-site inspection and on-site supervision. The Bank Regulation Department issues prudential instructions for the systematic and smooth operations of the financial institutions in line with the internationally accepted norms and best practices.

Generally, the Myanmar banking sector has remained stable and most of the banks were profitable over the past years. However, in early 2003, a few large banks experienced panic runs in part due to the effects of a loss in depositors' confidence sparked by the spill-over effects of the failure of general services companies outside the banking sector. The incidents have now been overcome after the Central Bank intervened as lender of last resort and supported adequate liquidity assistance to the banks. Owing to these efforts, almost all the commercial banks have returned to stable condition and are operating banking business in full swing.

2.2 Liquidity Provision Facility by CBM

2.2.1 During Normal Times and Crisis Times

The Ministry of Finance and Revenue issues T-bills with a maturity of 3 months to finance short-term budget shortfalls. T-bills can be—and frequently are—rolled over. The present interest rate on the T-bills is 4% p.a. In view of this exceptionally low rate of return, to date, no market

demand exists to invest in T-bills. As a result, the CBM is major investor of this asset and Myanma Investment and Commercial Bank also purchases the T-bills from CBM at a discount rate.

Treasuries in all countries encounter shortfalls requiring short-term financing during the financial year with respect to actual revenue and expenditure performance. An alternative to the current system practice in Myanmar is operation of an overdraft facility with the CBM for this purpose. Such an arrangement would make it possible to use T-bills, in the future, as market-based instruments for monetary policy. With a market-oriented return, T-bills should be transformed into a liquid security and a powerful instrument will exist providing short-term liquidity, which would benefit the development of a money market in Myanmar.

To provide more investment opportunities to the public and stimulate the emergence of a capital market in Myanmar as well as to introduce an indirect instrument of monetary policy, the Central Bank of Myanmar, on behalf of the government, has issued 3-year and 5-year government treasury bonds since 1993. It recently issued new denomination of 2-year government bond bearing interest rate of 10.5% p.a. Effective from 1st January 2010, 2-year, 3-year and 5-year government treasury bonds bear interest rates of 10.5, 11.0 and 11.5%, respectively. The treasury bonds deposited by the financial institutions in the Central Bank of Myanmar are treated as cash balance in calculating the reserve requirement.

To meet their liquidity shortage, banks can put up 3-year and 5-year government treasury bonds as collateral to obtain short-term loans (92 days) through the discount window facility provided by the CBM pursuant to its Instructions No.262 dated 14 November 1995. The interest rate on these short-term loans is the same as the Central Bank rate.

Figure 7
Purchasing, Depositing as Reserve Requirement and Making collateral for Short-term Loan of Government Treasury Bonds by Private Banks, As at June 30, 2009*

(Kyat in million)

Sr No	Name of Private Banks	Total T/Bond purchased	Deposited as Reserve Requirements	Collateral for Short-term loan	Free T/Bond held by banks
1.	Myawaddy Bank	75,300.00	-	-	75,300.00
2.	Kanbawza Bank	100,000.00	10,026.59	-	89973.41
3.	Myanma Livestock and Fisheries Development Bank	43,000.00	8552.38	-	34447.62
4.	First Private Bank	28,000.00	2178.63	-	25821.37
5.	Co-operative Bank	39,000.00	4536.03	-	34463.97
6.	Yangon City Bank	11,000.00	1087.24	-	9912.76
7.	Myanma Industrial Development Bank	12,300.00	1825.91	300.00	10174.09
8.	Myanmar Oriental Bank	9,300.00	1,847.79	-	7452.21
9.	Innwa Bank	7,000.00	-	-	7,000.00
10.	Myanmar Citizens Bank	4,400.00	-	-	4,400.00
11.	Tun Foundation Bank	3,800.00	-	-	3,800.00
12.	Yoma Bank	2,500.00	-	-	2,500.00
13.	Sibin Tharyaryay Bank	1,650.00	-	-	1,650.00
	Total	337250.00	30054.57	300.00	306895.43

*Remaining two private banks have no T/bond.

Previously, the state banks are not permitted to invest in government treasury bonds and are confined to 3-month treasury bills yielding 4% per annum. Starting July 2009, the state banks can invest in government treasury bonds. MEB is the major investor and its total outstanding investment to date is K450 billion.

There is always a danger of the possibility of a bank-run, i.e. a simultaneous withdrawal of deposits by a large number of depositors. In order to prevent such a thing from occurring, the central banks in all countries with a modern banking system act as the lender of last resort. In a developing economy, it is the most important function of a central bank, acting as the lender of last resort. That is, it will lend to other banks in times of crisis, in the form of its own bank notes, since it alone has the power to issue bank notes (or legal tenders).

Reflecting the above-mentioned central bank's function, the Central Bank of Myanmar acts as the sole issuer of domestic currency

either notes or coins, and also as the lender of last resort. The latter is performed only at the crisis times and Figure 8 provides the liquidity provision facility during crisis time which was occurred in early 2003, due to a loss in depositors' confidence sparked by the spill-over effects of the failure of general services companies outside the banking sector.

Figure 8
Liquidity Provision Facility During Last Crisis Time,
Within Year 2003

(Kyat in million)

Sr No	Name of Private Banks	Credit Line from CBM	Interbank Loan with MEB
1.	Myanmar Universal Bank *	-	3,997.07
2.	Kanbawza Bank	5,000.00	6,000.00
3.	Myanma Livestock and Fisheries Development Bank	-	5,779.42
4.	Co-operative Promoters Bank **	-	499.25
5.	Co-operative Bank **	-	2,500.00
6.	Co-operative Farmers Bank **		500.00
7.	Myanma Industrial Development Bank	-	500.00
8.	Myanmar Oriental Bank	-	2,000.00
9.	Myanmar May Flower Bank ***	-	3,000.00
10.	Asia Wealth Bank ***	6,000.00	9,000.00
11.	Tun Foundation Bank	-	409.81
12.	Yoma Bank	-	5,000.00
13.	Sibin Tharyaryay Bank	-	500.00
	Total	11,000.00	39,685.55

* Revoked license in August, 2005

** 3 co-operative banks were merged in May 2004 and reestablished as Co-operative Bank Ltd.

*** Revoked license in April, 2005

2.3 Central Bank's Requirement and/or Recommendations Regarding Bank's Liquidity Measurement and Management

The banks and other organisations of the financial sector are heavily regulated. Bank interest rates, both borrowing and lending, are

determined by law and conservative liquidity requirements are in place. Lending is restricted to short-term collateralised loans. Private banks are subject to a loan-to-deposit requirement which limits lending. According to this ratio, banks shall lend out not more than 80% of their deposits.

At present, Myanmar relies on heavy regulation and a policy of risk minimisation. However, if the authorities were to allow the financial sector, especially the organised part of it, to play a more significant role in economic development, a more modern style of supervision would be needed. That should include making the supervisory regime more accountable so as to contribute to stable economic development that can provide a safe haven for the savings of the personal sector.

Reflecting the heavily regulated environment, the on-site supervisory regime is more compliance-oriented than risk-assessment-oriented. The on-site teams are conducting inspections more along the lines of a conventional audit rather than performing a review of risk management procedures and processes that is associated with a more modern on-site regime.

Off-site analysis needs to be less compliance-based and more devoted to ensuring effective corporate governance and good risk management. More effort should be devoted to encouraging the development of effective risk management and improving corporate governance. While some of the work can be performed on-site, off-site analysts can leave verification of the implementation of such policies to the on-site examiners and focus on the process of obtaining, evaluating and assessing the policies for effective risk management.

3. Dynamics and Determinants of Liquidity in Myanmar

3.1 Development of Liquidity Indicators

3.1.1 Funding Liquidity

Figure 9
Ratio of liquid Assets in Relation to Short-term Liabilities

Particular	2005-2006				2006-2007			
	June	Sept	Dec	Mar	June	Sept	Dec	Mar
<u>Liquid Assets</u>								
1.Excess in Reserve requirement (Cash + Bal with CBM)				95,511	127,935	149,868	139,978	117528
2. Gold								
3. Cheques, drafts and all receivables				173	191	549	1353	309
4. Bills discounted, with maturities up to 3 months								
5. Government Securities and Securities Guaranteed by the Govt				72392	76822	98092	107542	112042
6. Due from Domestic Banks (on net basis)				7544	10535	12205	12119	10335
7. Borrowings using above assets as collaterals				12500	6300	2700	200	4000
Total Liquid Assets				163121	209183	258014	260792	236215
<u>Short Term Liabilities</u>								
1.Cheques, bills and all payables				2005	2629	2302	7843	3316
2. Due to Domestic Banks(on net basis)								
3. Deposits				3805	4787	2669	3646	4281
(1) Demand Deposit								
(2) Time Deposit				381614	410059	486604	512075	527858
Total Short Term Liabilities				387424	417475	491575	523564	535455
Liquidity Ratio (%)				42.10	52.55	52.49	49.81	44.11

Liquid Assets can be defined by its component.

Figure 9
Ratio of Liquid Assets in Relation to Short-term Liabilities

Particular	2007-2008				2008-2009				2009-2010
	June	Sept	Dec	Mar	June	Sept	Dec	Mar	June
Liquid Assets*									
1.Excess in Reserve requirement (Cash + Bal with CBM)	155139	76350	115999	112127	189303	183770	184962	164467	242769
2. Gold									
3. Cheques, drafts and all receivables	46.42	5154	1823	1235	51	460	1277	1233	903
4. Bills discounted, with maturities up to 3 months				2810	4910	23827	35959	33893	63378
5. Government Securities and Securities Guaranteed by the Govt	133492	166500	169450	168500	191950	222900	252850	284950	350600
6. Due from Domestic Banks (on net basis)	10271	11092	10576	12768	12421	13860	19213	12954	15185
7. Borrowings using above assets as collaterals		17850	4200	5150	800	550	17100	7400	300
Total Liquid Assets	298949	241246	293648	292291	397836	444267	477161	490097	672535
Short Term Liabilities									
1.Cheques, bills and all payables	7095	4234	11927	21500	41041	63532	72928	52269	137778
2.Due to Domestic Banks	75	1298	751	448	534	340	154	427	986
3. Deposits (1) Demand Deposit (2) Time Deposit	630064	631650	682458	681775	764133	840554	918653	934356	910967
Total Short Term Liabilities	637233	637182	695137	637233	805708	904426	991735	987052	1049731
Liquidity Ratio(%)	46.91	37.86	42.24	41.53	49.38	49.12	48.11	49.65	64.07

*Liquidity Asset can be defined by its component

Figure 10
Loans-to-Deposit Ratio (15 Private Banks)

Particular	2005-2006				2006-2007			
	June	Sept	Dec	Mar	June	Sept	Dec	Mar
Total Loans	228342	238004	249801	266601	260299	290460	323465	373373
Total Deposits	364583	343168	363075	382731	408844	491779	513143	547544
Loans to Deposits Ratio (%)	62.63	69.35	68.80	69.66	63.67	59.06	63.04	68.19

Particular	2007-2008				2008-2009				2009-2010
	June	Sept	Dec	Mar	June	Sept	Dec	Mar	June
Total Loans	369845	441619	472663	505471	483234	543753	586295	626979	644852
Total Deposits	628654	634940	687963	718120	777171	848794	926046	965596	1052702
Loans to Deposits Ratio (%)	58.83	69.55	68.70	70.39	62.18	64.06	63.31	64.93	58.83

Figure 11
Concentration in Assets or Liabilities (15 Private Banks)

	June 2005	Sept 2005	Dec 2005	Mar 2006	June 2006	Sept 2006	Dec 2006	Mar 2007	June 2007	Sept 2007	Dec 2007	Mar 2008	June 2008	Sept 2008	Dec 2008	Mar 2009	June 2009
Liabilities																	
1. Paid-up Capital	10.12	9.21	8.91	8.77	8.84	7.76	7.41	7.75	7.63	7.61	7.12	7.69	7.33	6.86	6.76	7.07	6.66
2. Reserves	2.32	1.64	1.51	2.07	1.92	1.60	1.50	2.07	1.81	1.68	1.53	2.18	1.94	1.70	1.53	2.03	1.80
3. Other Reserves	1.92	1.61	1.47	1.85	1.62	1.35	1.26	1.53	1.31	1.21	1.11	1.49	1.33	1.16	1.04	0.02	1.11
4. Revaluation Reserves	0.01																
5. Share Premium	0.04	0.08	0.09	0.12	0.13	0.12	0.12	0.13	0.12	0.14	0.13	0.18	0.12	0.11	0.10	0.11	0.11
6. Bal: of Profit and Loss A/C	-0.28	0.09	0.08	0.16	0.15	0.12	0.12	0.23	0.20	0.18	0.16	0.24	0.21	0.18	0.16	0.15	0.13
7. Customers Deposits	69.68	75.30	72.97	77.10	76.58	76.84	74.93	80.18	80.27	75.29	74.46	78.71	75.92	72.71	71.35	75.42	72.60
8. Due to Domestic Banks	0.60	0.24	0.30	1.09	1.50	0.83	0.79	0.73	0.31	0.54	0.16	0.21	0.19	0.22	0.16	0.17	0.27
9. Call Loans																	
10. Bills payable (Dom)	0.80	0.44	0.84	0.22	0.40	0.28	0.71	0.31	0.83	0.38	1.37	1.69	3.85	5.76	5.45	6.93	9.43
11. Borrowing from MEB					0.06	0.25	0.03			0.12		0.03	0.08				
12. Borrowing from MEB 2		0.66	0.76														
13. Borrowing from CBM	6.02	0.97	0.79	2.52	1.12	0.17		1.02		2.00	0.45	0.53		0.05			0.02
14. Borrowing from MWD	0.02																
13. Borrowing from other Bank	0.19														1.32	0.58	
14. Other Liabilities	8.34	9.49	11.98	5.78	7.36	10.35	12.62	5.53	7.04	9.74	13.13	6.71	8.74	11.01	11.90	5.61	7.66
15. Acceptances , Endorsements and Guarantee	0.22	0.29	0.29	0.32	0.33	0.31	0.51	0.52	0.50	1.11	0.36	0.34	0.29	0.25	0.23	0.27	0.23
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Assets																	
1. Cash	30.21	23.44	25.50	26.55	30.35	31.02	27.28	23.99	29.43	18.29	21.40	21.53	28.06	24.51	23.50	21.95	22.48
2. Equity investment	0.19	0.12	0.11	0.11	0.11	0.09	0.08	0.08	0.08	0.07	0.07	0.07	0.09	0.05	0.05	0.05	0.03
3. Loans and Advances	43.64	52.22	50.20	53.71	48.75	45.39	47.24	54.67	47.23	52.30	51.16	55.40	47.21	46.58	45.17	48.97	44.47
4. Treasury Bonds	17.19	15.42	14.21	14.52	14.33	15.22	15.70	16.41	17.05	19.64	18.34	18.47	18.75	19.09	19.48	22.26	23.26
5. Other Public Securities		0.08	0.06	0.06													0.01
6. Bills Purchased	0.15	0.05	0.10	0.02	0.06	0.22	0.20	0.13	0.30	0.80	0.26	0.26	0.54	2.08	2.84	2.70	4.42
7. Fixed Assets	4.28	3.27	3.17	2.93	2.79	2.57	2.50	2.52	2.21	2.09	2.02	2.09	1.98	2.02	1.87	2.27	2.08
8. Other Assets	4.12	5.18	6.34	1.77	3.23	5.18	6.47	1.67	3.22	5.71	6.39	1.84	3.09	5.43	6.87	1.53	3.02
9. Acceptances , Endorsements, Guarantee	0.22	0.29	0.29	0.32	0.33	0.31	0.51	0.52	0.50	1.10	0.36	0.34	0.29	0.25	0.23	0.27	0.23
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Figure 12
Capital-to-Deposit Ratio and Capital-to-Assets Ratio
(15 Private Banks)

	June 2005	Sept 2005	Dec 2005	Mar 2006	June 2006	Sept 2006	Dec 2006	Mar 2007	June 2007	Sept 2007	Dec 2007	Mar 2008	June 2008	Sept 2008	Dec 2008	Mar 2009	June 2009
Capital to Deposit ratio	0.20	0.17	0.17	0.17	0.17	0.14	0.14	0.15	0.14	0.14	0.12	0.15	0.14	0.14	0.13	0.15	0.13
Capital to Assets Ratio	0.14	0.13	0.12	0.13	0.13	0.11	0.10	0.12	0.11	0.11	0.09	0.12	0.11	0.10	0.10	0.11	0.10

3.1.2 *Maturity of Future Cash Flows of Assets and Liabilities or Maturity Gap between Assets and Liabilities*

Banks are subject to a reserve requirement of 10% of deposits and further liquid asset requirements of 20% of deposits, which must be satisfied in cash, balances with the CBM or treasury securities eligible as collateral for borrowing from the CBM². There is, therefore, a buffer of liquid assets, which in an emergency, can be drawn down to fund unexpected withdrawals of deposits.

The maturity gap can be clearly identified. This is because although most loans³ are short term, or at least renewable annually, deposits are predominately on current account, can be withdrawn on demand, or in savings accounts which also withdraw on demand, albeit subject to some restrictions on the rate and frequency of withdrawal. Time deposits and fixed-term deposits are negligible very small.

Experience in 2003 has shown that the private banks were indeed subject to very severe liquidity pressures and had to reduce balance sheets by as much as a half or even more in order to meet withdrawals. As memories of that experience fade, banks may become less conscious of the need to maintain liquidity, which is costly, especially given the low yields available on treasury securities. Here, the state banks are not permitted to invest in 3- or 5-year treasury bonds with a yield of 11.0 and 11.5% previously and now they can invest in it.

3.1.3 *Other Liquidity Ratios Used*

In Myanmar, the banks and other parts of the financial sector are heavily regulated. Law determines bank interest rates, both borrowing and lending, and strict liquidity requirements are in place. Lending is restricted to short-term collateralised loans.

On the liabilities side, the private banks are subject to a deposit-to-capital requirement which limits deposit-taking from the general public to 10 times the paid-up capital. In this regards, this ratio limits banks' ability to raise liabilities and therefore limit their ability to lend. Banks, in

2. Government treasury bond is the only and single collateral criteria for borrowing from the Central Bank.
3. Bank lending is limited to one year, which does restrict the extent of possible maturity transformation. But loans may be renewed for a further two years. It is normal practice for a borrower to repay loans from other sources before a new agreement is concluded.

turn, become very selective in advancing loans, and therefore lending is restricted to very creditworthy borrowers able to provide good collateral.⁴ As a consequence, coupled with the bank's legal inability to lend long, there have allegedly been few non-performing new loans in recent years, with some private banks reporting having zero NPL. The ratio of NPL to total loans of 15 private banks is shown in Figure 13.

Figure 13
Ratio of NPL to Total Loans of 15 Private Banks and SOB

%	June 2005	Sept 2005	Dec 2005	Mar 2006	June 2006	Sept 2006	Dec 2006	Mar 2007	June 2007	Sept 2007	Dec 2007	Mar 2008	June 2008	Sept 2008	Dec 2008	Mar 2009
NPL to Total Loans(Private bank)	3.86	3.16	3.14	3.42	4.25	4.17	3.97	2.38	2.83	2.56	2.78	2.24	3.00	2.33	2.35	2.84
NPL to Total Loans(State- owned banks)	18			19				23				20				27

Figure 14
Borrowing from the Central Bank's Lending Facility

(Kyat in million)

	June 2005	Sept 2005	Dec 2005	Mar 2006	June 2006	Sept 2006	Dec 2006	Mar 2007	June 2007	Sept 2007	Dec 2007	Mar 2008	June 2008	Sept 2008	Dec 2008	Mar 2009	June 2009
Borrowing from Central Bank against Treasury Bonds	31490	4400	3950	12500	6000	1100		7000		16850	4200	4850		550			300

4. In any case, banks are now required to lend only on the basis of cash or real-estate collateral.

3.1.4 Qualitative Measures

Figure 15
Overall Financial Position of 15 Private Banks

	Mar 2005	Mar 2006	Mar 2007	Mar 2008	Mar 2009
Capital Adequacy Ratio (CAR)	45.29	43.10	38.98	40.04	39.66
Asset quality					
Non-performing loans to total gross loans	3.54	3.07	2.38	2.25	3.00
Non-performing loans net of provisions to capital	3.46	4.00	10.86	10.18	12.00
Earnings and profitability					
Return on assets	2.06	2.93	2.94	0.71	2.00
Return on equity	15.55	22.51	24.97	26.77	22.00
Interest margin to gross income	43.79	53.79	50.80	56.39	53.00
Non-interest expenses to gross income	56.29	48.87	50.23	46.84	48.00

Figure 16
Ratio of Excess Liquidity to Required Reserve (in Percent)

	Mar 2006	Mar 2007	Mar 2008	June 2009
Excess Liquidity to Required Reserve	0.07	0.04	0.03	0.04

In accordance with the captioned indicators post-crisis, the private banks have adjusted in some remarkable ways, with many of them being able to add significantly to their paid-in capital. With strong emphasis on liquidity, the bank's liquidity ratios have also strengthened. As a result, the data on liquidity and capital ratios are very high (see Figure 15). From the financial year 2005-2006, public confidence in the banking sector has strengthened with growth in deposits. At the same time, based on the data, the level of non-performing loans for the private banks stands at not more than 3%, while that of the state banks is round 25% because of their credit operation is directed-lending based on non-commercial criteria. When over time, such loans to state-owned enterprises became non-performing loans.

More to the point, at issue here is one concerning the safety and soundness of the banking system, which is essential for the healthy development of economies. Capital-deposit ratio and capital-assets ratio (Figure 12) are the simplest and oldest measures employed to ascertain capital adequacy, meaning whether the bank has enough capital to absorb losses stemming from making loans and investments. In this respect, the regulatory authorities in most countries have in place minimum capital

requirements for banks as measured by capital adequacy ratio (CAR)⁵. The minimum capital adequacy ratio or capital requirement for private bank as prescribed by CBM is 10 % of risk-weighted assets. Furthermore, in calculating the said ratio, bank capital is defined to include issued and paid-up capital, paid-up share premium, reserves, and retained profits. This is standard international practice (BIS)⁶. The definition of capital in the banking industry is somewhat different from that in other lines of business, and with good reasons since reserves, retained profits, etc., are not only owned by the bank, they but could also be used to absorb losses.

Capital, Liquidity and Reserve Requirement are the main indicators analysed in this chapter and they reflect the liquidity situation in Myanmar.

4. Liquidity Risk Management in Banking

4.1 Past Development

Chapter VIII of the Central Bank of Myanmar Law (CBML)⁷ empowers the CBM to require banks and financial institutions to maintain required reserves and specified liquid assets against such deposits and similar liabilities and all privately-owned commercial banks shall comply in the following manner at normal time:

- **Reserve requirement ratio:** Required reserves shall be maintained by way of cash holdings, or by way of deposits with the CBM, or by both, in such proportion as the Central Bank may from time to time determine. In June 2009, the level of required reserves was (7.26%) of total liabilities of a bank.
- That required reserves for a bank shall not exceed 35% of the total liabilities of the bank. However, if the CBM Board of Directors considers that there are serious inflationary pressures, it may increase required reserves above the

5. The Basel Committee specified a minimum ratio of total capital to weighted risk assets of 8% (The Basel Committee on Banking Regulations and Supervisory Practices).

6. Bank for International Settlements.

7. Central Bank of Myanmar Law (CBML), enacted in 1990.

maximum 35% limit. In such a case, the CBM is obliged to pay interest on the required reserves exceeding the 35% limit provided that such rate of interest will not exceed the minimum discount rate prevailing in the Central Bank.

- **Liquidity requirement ratio:** Liquid assets shall consist of freely transferable assets, free from any charge or lien, and of the kind and amount specified by the CBM. In June 2009, the level of liquidity ratio was (64.07%) of deposits at banks.
- **General Provision:** Banks shall maintain a general provision account amounting to at least 2% of total outstanding loans/advances at the financial year since loans convey the highest returns for banks.
- **General Reserve Account:** Under the provisions of Financial Institutions of Myanmar Law (FIML)⁸, banks shall set aside (25 %) of its net profits in a general reserve account until this account reaches (100 %) of its paid-up capital.
- **Lending Limit:** Banks shall not lend more than 20% of their capital plus reserves to a single individual, an enterprise or an economic group.

Banks shall put up 3-year and 5-year government treasury bonds as collateral to obtain short-term loans (92 days) to fulfill their liquidity shortfall, through the discount window facility provided by CBM under the CBM's Instructions No.262 dated 14 November 1995. Moreover, banks can resell their holding of treasury bonds at the discount rate when they are faced with a serious liquidity problem. The interest rate/discount rate on these short-term loans is same as the Central Bank rate. This is the liquidity management of banks in crisis time.

4.2 Current Practices

Public confidence in the banking system has gradually recovered from the banking crisis. Some administrative measures taken by the CBM include the application of its supervisory requirements to both state and private banks, relaxation of the restriction for opening of new bank

8. Financial Institutions of Myanmar Law (FIML), enacted in 1990.

branches and review of risk management guidelines issued, but the overall regulatory environment as described in Section 4.1 remains unchanged.

Banks shall raise their paid-up capital under the following conditions: when they intend to source for deposits exceeding ten times their paid-up capital; when they have a shortfall in their CAR; and when they do not meet the requirement of free capital at 50%.

5. Lessons Learned in Myanmar

5.1 Trends in Liquidity Risk Management Practices Before and After the Recent Global Financial Crisis

Since the banking crisis in 2003–04, the financial system in Myanmar has not encountered any serious instability. This includes recent periods when major parts of the world have endured extreme financial volatility. As mentioned in the previous sections, the banking system in Myanmar is currently has minimal risk.

5.2 Role of Liquidity Risk in Triggering Past Financial Crises

The banking crisis that started in 2003 seriously affected the performance of the banking sector for a couple of years. The key points in the crisis are summarised as follows:

- (i) February 2003: Acute problems arose among the illegal financial firms involved in pyramid schemes. A decline in public confidence generated massive depositor runs on private banks.
- (ii) In March: the private banks had lost 40 % of their deposits.
- (iii) By September: their deposits were depleted by two-thirds, much of this withdrawals migrated to the state banks, which the public perceived as safer, or less likely to be closed. A severe liquidity problem was thus created in the private banks.
- (iv) The authorities' response was to restrain bank withdrawals, which further undermined public confidence, and to order private banks to strengthen their cash position by calling

in loans. These banks tended to shorten the term of new lending. The authorities required private banks to adhere to a deposit-to-capital ratio capped at 7 times, thereby constraining their ability to collect new deposits.

- (v) All these measures aggravated the liquidity problems, which spread to the real sector through a sharp drop in the volume of financial intermediation. At its peak, six problem banks were prohibited from accepting new deposits or extending any new credits. Later, three of the banks were allowed to resume normal operations, while two were closed, and one remained under a special supervisory regime.
- (vi) Early 2004: Deposits started returning to the private banks, but at a low level.
- (vii) In June, three private banks merged.

5.3 Development of Liquidity Situation (in Banking Sector) Before and After Recent Global Financial Crisis

Although the banks have well recovered from the 2003–04 crisis and Myanmar was largely unaffected from the direct impact of the global crisis by the absence of any significant linkages to major crisis-affected countries, the existing conservative liquidity requirements are still in place and the fundamental structural problems and other weaknesses in the financial system remain.

5.4 Future Prospects

The financial crisis triggered by lack of liquidity risk management notwithstanding, immediate steps can be taken to support economic growth with less restrictive liquidity requirements and credit policies while maintaining banking system stability. The deposit-to-capital ratio and the stringent collateral requirements effectively limit bank lending and should be relaxed. Further, the pre-2003 list of acceptable collateral for bank lending could be reintroduced and the 100% collateral-to-loan ratio reduced. The banking sector stability can be better addressed using the existing framework of liquid assets and reserve requirement ratios.

6. Conclusion

The event of 2003 has shown the importance of liquidity risk. Banks are required to maintain a stock of liquid assets as well as holding reserves at the Central Bank. Looking forward, banks that develop policies and processes for identifying such risks are better placed to control them and can react quicker if conditions of stress re-emerge.

Furthermore, the supervisory arrangements should seek to ensure that risks taken are understood and managed, that the risks are appropriately priced and that adequate capital is held against unexpected losses.

As noted above, the financial system in Myanmar is strongly dominated by banks while the insurance sector and the securities market are relatively small. Though the banks and other parts of the financial sector are heavily regulated, the regulations are highly risk-averse. There is very limited opportunity for market liquidity risk. Most banks in the world have some FX risk which also can trigger a liquidity crunch, but even foreign banking is only permitted for state-owned banks in Myanmar.

Moreover, Myanmar has no traded debt securities as well as no equity market. Its T-bonds are not marketable security and they are held to maturity. In this context, Myanmar is making its best effort to develop a bond market. Several actions are needed to widen and deepen an active market for T-bonds, including: provision of more competitive rates of return, increase in the number of T-bond maturities, and broadening the investor categories to enhance the market influence. The positive steps taken in developing the government bond market are: the issuance of 2-year T-bond to tap a wider investor base with effect from January 1, 2010, implementation of the roadmap of the Capital Market Development Committee within the planned time frame, and appointment of the MSEC and MEB to underwrite the Government T-bonds.

Another highlighted issue, which can foster the liquidity problem of banks, is maturity mismatch. Generally speaking, traditional banks lose from interest rate increases because assets have longer maturities than liabilities. Since the absence of derivative products in Myanmar, hedging interest rate risk is probably not practiced in Myanmar.

Basel I apply a capital charge to risk in the trading book but not in the banking book. In many countries there is no trading book, so the risk is not covered by capital. Supervisors in Myanmar use higher minimum capital ratio.

The conservative liquidity requirements are in place. Lending is restricted to short-term collateralised loans. Private banks are subject to a loan-to-deposit requirement which limits lending. That, in turn, enables the banks to be very selective in advancing loans, and therefore lending is restricted to very creditworthy borrowers who are able to provide good collateral.

The supervisory framework is required to be more risk-focused and forward-looking. The capital adequacy arrangements should be broadened, the risk-weightings should be more in line with international best practices and applied in a more risk-sensitive way. Banks will need to be more proactive in managing liquidity and supervisors challenging of that management.

There is no doubt that risk management has become increasingly complex, not only in relation to financial trading activities, but also in relation to the risk found on traditional bank balance sheets. Risk management is therefore becoming a much more skilled activity than in the past.

The latest global financial crisis showed that risk management must be made to work in practice as well as in theory. The ongoing task for banks' management and bank supervisors is to ensure that those involved in risk-management activities are alert to potential operational deficiencies and act quickly to rectify any deficiency that exist.

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LIQUIDITY MEASUREMENT AND MANAGEMENT IN THE PHILIPPINES

by Neil Angelo C. Halcon¹

1. Introduction

The onset of the global financial crisis had driven monetary authorities around the globe to re-consider and re-visit operations and policy instruments in liquidity management. The underlying debate is whether liquidity (or money in circulation) is too much or too little, under periods of normal condition or in times of financial crises, for the central bank and financial institutions to manage. With this in mind, it is important to look into key indicators of funding liquidity risks, market liquidity risks, and qualitative measures that may contain information in aiding central banks to re-formulate and re-think instruments and procedures to efficiently manage risks in relation to funding and market liquidity in the Philippines' financial system.

2. Overview of Financial System and Commercial Banking Industry

The Philippine financial system comprises a set of financial institutions intricately organised and structured to facilitate financial transactions taking place within the various facets of the economy. Driven by economic policy and structural changes in the 1980s and the 1990s, the financial system gradually evolved from a simple structure to one of increasing strength and sophistication. The sustained thrust in the reform process in the 1990s facilitated the rapid expansion and eventual integration of the local financial system with the rest of the world. The structural reforms that allowed freer entry of foreign capital paved the way for healthy bank competition, increased efficiency as new technology came about, encouraged greater transparency and broadened the country's opportunities for growth.

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Notwithstanding these gains, financial integration has also heightened the country's vulnerability to external shocks and exposure to risks. The recent episode of financial crisis exposed the country's vulnerability to shocks due to some structural weaknesses and in managing private capital flows. While policy measures were called in to address these perceived policy and structural weaknesses, their efficacy have been dampened as the evolving structural changes in the international financial landscape ushered the emergence of new forms of risks.

2.1 Banking Sector versus Capital Markets

The banking sector remains as the most dominant player in the Philippines' financial system. With the corporate sector getting much of its financing needs from banks, and with the Philippines' capital market still in its early stages of development, it is important for banks to be as liquid as possible – especially in times of excessive withdrawals by households or excessive corporate loan grants to various business entities.

The capital market, meanwhile, still lags behind other members in the Asia-Pacific region in relation to financial developments. According to the 2008 Financial Development Report by the Geneva-based World Economic Forum (WEF), the Philippines ranked 48th out of the 52 countries included in the survey. Only Vietnam ranked lower at 49th. The Asia-Pacific countries which fared better than the Philippines include Korea at 19th, Malaysia at 20th, China at 24th, Thailand at 29th, and Indonesia at 38th place, respectively. With this in mind, government issuances continued to dominate the Philippine debt market, accounting for 95.2% of the total outstanding domestic debt for 2008.

Meanwhile, the corporate sector continued to rely heavily on bank loans which provided 83% of its funding requirements, higher than the 58.0% registered in 2007. On the other hand, the share of capital raised from the equities market accounted for only 2% of total funds, substantially lower than the 33% share in 2007. The reduction in corporates' reliance on the equities market as a source of funding during the period mirrored the generally bearish market sentiments triggered by the heightened anxieties over a prolonged financial crunch, and the increased preference of risk-averse investors for safer investment havens.

2.2 Profile of the Banking Sector

The Philippine financial system consists of banks and non-bank financial institutions. Within the banking sector, banks are further classified as expanded commercial or universal banks (KBs), regular commercial banks, thrift banks and savings banks. Bank type is based largely on capitalisation, operation and, in some cases, market area covered. At the apex of the structure is the Bangko Sentral ng Pilipinas (BSP) which is the highest regulatory agency in the banking system. The BSP's role in banking supervision is complemented by three other regulatory agencies, namely: (1) the Philippine Deposit Insurance Corporation (PDIC); (2) the Securities and Exchange Commission (SEC); and (3) the Department of Finance (DOF).

The Philippines has a comprehensive banking system encompassing various types of banks, from large universal banks to small rural banks and even non-banks. At present there are 17 universal banks, 23 commercial banks, 84 thrift banks, 711 rural banks, 44 credit unions, and 12 non-banks with quasi-banking functions, all of which are licensed and regulated by the BSP.

2.2.1 Steady Increase in Resources.

In the last 13 years, the financial sector has benefited from a number of liberalisation and deregulation initiatives as globalisation takes stronger roots in the Philippines. As a result, the Philippine financial system's underlying fundamentals have posted steady improvements since the year 2000. As of end-March 2006, the total assets of the Philippine banking system amounted to ₱4.4 trillion, about one and a half times the amount recorded in 1997. Commercial banks (KBs), which are further subdivided into universal and commercial banks, continued to be the dominant players in the banking industry, accounting about 90% of the industry's total assets, and over 80% of the financial system's total assets as of end-March 2006.

2.2.2 Healthy Indicators of Banking Growth.

For 2008, the Philippine banking system remained generally sound and stable, despite the negative developments emanating from the continuing global financial crisis and episodes of rising inflation during the first eight months of the year. The reforms implemented in the past years strengthened the industry in terms of risk management, corporate

governance and transparency. Growth indicators such as asset levels, loans and deposits continued to show robust increases. The banking sector's asset quality also exhibited a notable improvement as shown by the continued decline in the non-performing loan (NPL) ratio while the capital adequacy ratio (CAR) remained above global standards and the BSP's regulatory requirement.

Results of the latest BSP Senior Bank Loan Officers' Survey showed that bank credit standards and credit demand was basically unchanged for enterprises and households for Q2 2009 and Q1 2009. In the said survey, only about a fifth of the respondents reported that their credit standards for enterprises tightened somewhat and only 2 out of 14 respondents reported the same for households.

2.3 Profile of the Government Bond Market

The government bond market plays an important role in fostering financial stability as it develops a term structure of interest rates (yield curve) and provides a benchmark for market pricing of other financial instruments. It serves as a catalyst for the development of a deep and liquid money and bond markets. The market is a source for funding fiscal deficits. Movements in the cost of borrowing funds from this market can affect the ability of both the public and private sectors to finance their borrowings. For instance, an increase in interest rates on government bonds raises the government's cost of borrowing, which can then translate to higher lending and borrowing rates by banks as these government bonds serve as banks' benchmark rates.

Government issuances continued to dominate the Philippine debt market, accounting for 95.2% of the total outstanding domestic debt in 2008. Outstanding government securities (GS) amounted to ₱2.5 trillion, 59.1% of which were regular issuances [e.g., Treasury bills (T-bills) and Fixed-Rate Treasury bonds (FXTBs)]. T-bills comprised the bulk of regular issuances at ₱770 billion (52.7%). Meanwhile, private issuances comprised the rest of the domestic debt market at ₱125.0 billion or 4.8% of the total, a marked improvement from the 0.9% share posted in 2003.

Asset-backed securities (ABS) comprised the bulk of private issuances at ₱80.3 billion, with the rest issued in bonds, corporate notes, and commercial paperlines.²

In the primary market, the NG (national government?) raised its programmed borrowings in 2008 by 14.9% to ₱303.0 billion from ₱263.8 billion in 2007. The NG made partial awards and only accepted ₱68.2 billion and ₱79.9 billion worth of T-bills and T-bonds, respectively. The NG also rejected fully some bids, and even cancelled a number of scheduled auctions for both the T-bills and T-bonds. For the entire second quarter, the sale of the 91-day and the 182-day T-bills was cancelled partly because the NG's cash flow reflected a bunching of maturities for short-term issuances. The NG likewise cancelled the last two T-bond auctions in July to give way to the issuance of the Retail Treasury Bonds (RTBs) on 30 July 2008.³ The GS market was oversubscribed, as total tenders reached ₱195.4 billion and ₱271.9 billion for T-bills and T-bonds, respectively.⁴

Meanwhile, secondary market trading of government debt papers at the Fixed Income Exchange (FIE) increased despite the actual decline in GS issuances. Total transactions at the FIE reached ₱1,935 billion, 23.7% higher than the ₱1,564.0 billion posted a year ago. The average daily volume of around ₱7.9 billion was 21.5% higher than the ₱6.5 billion daily average in 2007. This reflected continued market confidence in the FIE as a trading platform of fixed-income instruments and as a channel for maintaining adequate liquidity to support the strong uptrend in transactions despite the global credit crunch. Fixed Rate Treasury Notes (FXTNs) were the most traded instruments, accounting for 87.5% of all transactions at the FIE during the year.

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2. Data was sourced from the PhilRatings. For lack of available data, the issued amount was used instead of the outstanding amount for private debt issuances, which were in the form of asset-backed securities (ABS), bonds, corporate notes, as well as short- and long-term commercial paper lines. The data also exclude unsecured subordinated notes (Tier 2) which have some characteristics of both debt and equity. Tier 2 capital are long-term notes or debt obligations, with tenors usually 10 years and up, but are allowed to form part of the capital of the issuer.
 3. The NG has raised a total of ₱70.0 billion from the sale of RTBs consisting of ₱29.003 billion in three-year and ₱40.997 billion in five-year tenors. Of the said amount, ₱9.124 billion were sold to eligible dealers through a Dutch Auction on 18 July, about ₱50.876 billion were subscriptions received by the selling agents during the public offering period and ₱10.0 billion were sold to GOCCs and other tax-exempt institutions through the BTr's over-the-counter window.
 4. Oversubscription is the gap between the amount tendered and the amount offered for a given instrument.

3. The Role of the Bangko Sentral ng Pilipinas

3.1 Liquidity Provider and Financial Regulator

The BSP provides policy directions in the areas of money, banking and credit. It supervises operations of banks and exercises regulatory powers over non-bank financial institutions with quasi-banking functions. Under the New Central Bank Act, the BSP performs the following functions, all of which relate to its status as the Republic's central monetary authority.

i. **Liquidity Management.** The BSP formulates and implements monetary policy aimed at influencing money supply consistent with its primary objective of maintaining price stability.

ii. **Currency Issue.** The BSP has the exclusive power to issue the national currency. All notes and coins issued by the BSP are fully guaranteed by the government and are considered legal tender for all private and public debts.

iii. **Lender of Last Resort.** The BSP extends discounts, loans and advances to banking institutions for liquidity purposes.

iv. **Financial Supervision.** The BSP supervises banks and exercises regulatory powers over non-bank institutions performing quasi-banking functions.

v. **Management of Foreign Currency Reserves.** The BSP seeks to maintain sufficient international reserves to meet any foreseeable net demands for foreign currencies in order to preserve the international stability and convertibility of the Philippine peso.

vi. **Determination of Exchange Rate Policy.** The BSP determines the exchange rate policy of the Philippines. Currently, the BSP adheres to a market-oriented foreign exchange rate policy such that the role of Bangko Sentral is principally to ensure orderly conditions in the market.

vii. **Other Activities.** The BSP functions as the banker, financial advisor and official depository of the government, its political subdivisions and instrumentalities and government-owned and –controlled corporations.

3.2 BSP Regulations Pertaining to Liquidity Management

The BSP manages liquidity through the various monetary policy instruments: open market operations, reserve requirements, policy rates, rediscounting facilities. The Philippines possess one of the highest reserve requirements in the Asia-Pacific region. The BSP sanctions banks to maintain 19% as total reserve requirements wherein 8% comprises the statutory reserve requirements, while the remaining 11% comprises the liquidity reserve requirements that are imposed on financial institutions.

With the onset of the current global financial crisis, it is the BSP's commitment to ensure that liquidity conditions are supportive of the spending and investment needs of firms and households, while keeping a watchful eye on price stability.

The recent lowering of the risks to inflation allowed the BSP to cut its policy rates by a total of 200 basis points since December 2008. The BSP's decision to ease the monetary policy stance was based on the Monetary Board's assessment that inflation would stay within target over the course of the policy horizon.

This 200 basis-point cumulative reduction in the policy rate will help stimulate economic growth or help moderate the slowdown by bringing down the cost of borrowing and reduce the financial burdens on firms and households. This will help us avoid or at least mitigate the negative feedback loop from weakening economic conditions to the functioning of the financial sector. Lower policy rates would also have the effect of shoring up business and consumer confidence.

The latest inflation forecasts continue to show subdued price pressures, with headline inflation expected to settle at around the middle of the target range for 2009 and at the lower bound of the target range for 2010. On balance, downside pressures on prices predominate due mainly to expectations of a marked deceleration in global economic activity, which is expected to continue to dampen imported inflation and inflation expectations, and weaker domestic demand conditions.

In addition to the reduction in its policy rates, the BSP also moved to ensure that there is sufficient liquidity in the system. The BSP:

- i. Enhanced the existing peso repurchase agreement (repo) facilities through relaxed valuation and a broader list of acceptable collaterals;
- ii. Established a US dollar repo facility to augment dollar liquidity in the foreign exchange market and ensure the ready availability of credit for imports and other legitimate funding requirements;
- iii. Reduced the regular reserve requirement by two percentage points on 14 November 2008;
- iv. Liberalised rediscounting guidelines which include increasing the rediscounting budget to ₱40 billion in 14 November 2008 and to ₱60 billion on 02 March 2009, aligning rediscounting rate with the RRP rate, easing the NPL ratio requirement and increasing loan value of all eligible papers; and
- v. Launched the Credit Surety Fund (CSF) Programme which provides guarantee to small cooperatives to ensure continued access to financing of small businesses.

Enough measures are already in place to encourage banks to clean up their inventory of non-performing assets. These measures essentially allowed banks to spread out the losses that may arise from the sale or transfer of non-performing assets (NPAs) at deep discounts.

- i. Banks were allowed to defer or spread out the booking of their losses over a period of 10 years (Memorandum to All Banks and Non-Bank Financial Institutions with Quasi-Banking Functions dated 16 February 2004).

Year	1	2	3	4	5	6	7	8	9	10
	5%	10%	15%	25%	35%	45%	55%	70%	85%	100%

- ii. Moreover, the BSP allowed banks to undertake joint venture agreements (JVA) with real estate developers to convert their idle and foreclosed properties (“Real and other properties acquired or ROPA”) into income-generating assets (Circular No. 518 dated 09 March 2006). As of 26 June 2009, a total of ₱12.2 billion worth of bad assets were entered into JVAs by

banks with various developers. A total of P0.1 billion worth of JVA applications are still in the pipeline.

- iii. As a policy response to address NPL loans, the BSP required banks to set up buffers from losses arising from possible loan defaults through the implementation of the following loan-loss provisioning rules for banks (Circular No. 143 dated 01 October 1997, as amended):
 - 5% - unclassified restructured loans
 - 1% - unclassified loans other than restructured loans

In periods of national and/or local emergency, or of imminent financial panic, which directly threaten monetary and banking stability, the Monetary Board may, by a vote of at least five (5) of its members, behaviour the Bangko Sentral to grant extraordinary loans or advances to banking institutions secured by eligible assets, provided that while such loans or advances are outstanding, the debtor institution shall not, except upon prior ehaviortion by the Monetary Board, expand the total volume of its loans or investments.

As of 23 July 2009, outstanding rediscounting loan availments reached ₱53.3 billion, of which about 90% was channeled to commercial banks, 7% to thrift banks, and 3% to rural banks.

The increase in the budget for the rediscounting facility was a preemptive move to ensure orderly market conditions and greater confidence in the financial system. Any decision to increase the budget would be based on an assessment of current monetary conditions and the inflation outlook.

Figure 1
Rediscounting Facility

Rediscounting Facility Outstanding balances of all banks at month-end (in billion pesos)	
Month	Outstanding Balance
Oct-08	18.1
Nov-08	24.8
Dec-08	27.7
Jan-09	32.5
Feb-09	29.1
Mar-09	26.8
Apr-09	30.5
May-09	31.4
Jun-09	53.1
Jul-09	53.3

The adjustments in rediscounting facility are temporary measures that cannot be maintained indefinitely. The behavior of banks in terms of availing themselves of the facility would also depend on the prevailing conditions and options at the time of the unwinding.

3.3 Key Regulations on Business Activities by the Banks

In an attempt to improve the banking sector, the government introduced stricter banking regulations under the Basel II accord. The accord will help ensure that financial institutions have enough capital against risky ventures to prevent bank failures. In addition to the implementation of such measures, there is a high degree of discipline relative to other Asian countries in the lending practice of the central bank.

To support the development of the capital market in the Philippines, the BSP implemented and/or supported the following reform initiatives:

- i. ***Supported a private sector-led initiative, began in 2001, to establish a fixed income exchange (FIE)*** to help institutionalize a liquidity and price discovery mechanism for secondary trading of fixed-income securities, provide the public with more investment options apart from traditional equities and open up more avenues for private and public sector issuers to tap low-cost capital

- ii. ***Issued regulations to help institutionalise third-party custodianship for securities.*** To provide investors with better protection from fraudulent acts of multiple securities sales, prevent price manipulation and facilitate the development of a repo and securities borrowing and lending market, the BSP mandated the transfer of securities (used for quasi-banking functions) by banks under BSP supervision to BSP-accredited custodians in 2003.
- iii. ***Issued guidelines in 2004 to pave the way for the creation of unit investment trust funds (UITFs) to replace CTFs.*** This is intended to institutionalise internationally acceptable best practices in the administration of common trust funds (CTFs).
- iv. ***Upgraded the existing payment system into a real time gross settlement system (RTGS).*** This is intended to enhance the operational efficiency, reliability, speed, and timeliness of payment transactions in the face of the rapidly increasing volume and large value of payment transactions.
- v. ***Enhance the domestic rating capacity*** and meet the growing need for credit rating services by both the financial industry and regulators, the BSP established minimum eligibility criteria for the recognition or non-recognition of domestic credit rating agencies for bank supervisory purposes in 2003.

Effective on 10 May 2007, the BSP implemented the following measures to enhance its liquidity management:

- i. Encourage GSIS, SSS, and other government-owned and –controlled corporations (GOCCS) to deposit funds with the BSP;
- ii. Allow trust entities under BSP supervision to deposit funds with the BSP; and
- iii. Allow special deposit account (SDA) placements of banks to be considered as alternative compliance with the liquidity floor requirements for government deposits.

These measures are intended to help prevent potential inflationary pressures that could build up over the medium term as a result of rapid money supply growth driven mainly by foreign exchange inflows, which in turn have been encouraged by strong macroeconomic fundamentals and positive market sentiment on the country's economic prospects. The measures were drawn following a series of consultations undertaken by the BSP with GOCCs, the banking industry, and financial market players.

The Fixed-Term Deposit Facility for GOCCs is an existing facility but the BSP is encouraging the GOCCs to make greater use of this instrument by pricing it more competitively and in line with the BSP's policy interest rates.

Meanwhile, trust entities under BSP supervision will be allowed to deposit in the BSP's SDA facility. Such placements will be treated as separate from those of the parent institution but will be likewise subject to SDA guidelines, including the tiering scheme. On the other hand, the eligibility of SDA placements with the BSP as alternative compliance to the liquidity floor requirement will provide banks with greater flexibility in meeting the prudential requirements for government deposits.

Consistent with its commitment to prudent monetary policy, the BSP will continue to pay close attention to the potential risks to inflation, notwithstanding the benign inflation outlook. The monetary authorities believe that the new measures can prove effective in reining in strong liquidity growth, and therefore stand ready to reassess the settings for monetary policy once the impact of the new measures is fully transmitted to the financial system.

4. Dynamics and Determinants of Liquidity

4.1 The Financial System's Liquidity Profile

4.1.1 Improvement in Asset Quality

After nearly seven years (from 9.64% at end-July 1998), the commercial banking system's NPL ratio of banks was back to a single-digit mark at 8.2% as of end-December 2005. Further updates show KBs' NPL ratio has dropped further to 8.2% as of end-April 2006. The decline reflected the steady progress in banks' disposition of their idle assets since the implementation of the Special Purpose Vehicle Act (SPVA) in 2002 and the sustained, though modest rise in total loans of banks. About 17.8%

of banks' non-performing assets were disposed under the SPVA. The banking system's asset base has been expanding steadily, supported by sustained growth in deposits. As of end of April 2009, the total resources of the banking system stood at ₱5.8 trillion. Banks have been offloading their non-performing assets and problem loans. As a result, the NPL ratio is now at the pre-Asian crisis level of around 4.0%.

4.1.2 Capital Position above Prescribed Norms

The latest data show that the banking industry is well capitalised. The capital adequacy ratio (CAR) of banks on a consolidated basis was recorded at 17.4% as of June 2005. The ratio exceeds the 8% BIS standard and 10% set by the Bangko Sentral ng Pilipinas (BSP).⁵ Tier 1 capital comprised 99.4% of qualifying capital.⁶ Compared with its counterparts in the region, the country's CAR remains above those of Malaysia, Thailand, and Korea which showed CARs above the BIS standard. Banks have remained adequately capitalised at levels above both the BSP-regulatory requirement of 10% and the international (BIS) standard of 8.0%. Bank lending growth has remained healthy, in part reflecting the easing of monetary policy since the fourth quarter of 2008. Credit flows continued to support the productive sectors of the economy even against the backdrop of tight liquidity conditions in the global financial markets.

4.1.3 General Downtrend in Profitability Ratio

The industry's profitability weakened since 1997 as reflected in the downtrend in both the return on assets and equity. The decline may be traced partly to increased loan provisioning of banks for their bad loans. Bank earnings recovered in 2001 through 2003 but resumed its downtrend in 2004. The spike in the profitability ratio in 2003 resulted from a significant reduction in below the-line items, particularly extraordinary credits as a commercial bank sold a substantial portion of

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5. The capital adequacy ratio or CAR is a risk-sensitive measure of a bank's solvency. It relates capital to risk assets weighted according to their relative riskiness. BSP Circular No. 280 dated 29 March 2001 and BSP Circular No. 360 dated 3 December 2002, both as amended, require all banks to maintain CAR of at least 10% on solo basis (i.e., head office plus branches) and consolidated basis (i.e., parent bank plus subsidiary financial undertakings, but excluding insurance companies) covering credit risk, and for universal and commercial banks, combined credit and market risks.
 6. Tier 1 capital refers to core capital, mainly shareholders' funds, while Tier 2 refers to supplementary capital, such as preferred stocks and subordinated debt. The remaining balance comprising deductions include investment in equity of subsidiary insurance companies and non-allied undertakings.

its non-performing loans. Furthermore, the profitability of the banking system has remained resilient in 2008, although with some moderation of late.

4.2 Development of Liquidity Indicators

4.2.1 Funding Liquidity

Year-on-year (YoY) figures showed a banking system⁷ that is resilient to the global financial crisis. Total loan portfolio⁸ for March 2009 remarkably grew by 21%. In particular, loans to the agriculture sector, private corporations, SMEs and individuals expanded by 44%, 21%, 15% and 7%, respectively. Quarter-on-quarter (QoQ) numbers, however, illustrate the creeping effects of the global financial crisis. The QoQ growth of loans to private corporations and individuals, which collectively make up 70% of the banking system's total loan portfolio, decelerated in the past year – growth rates of 25%, 9%, 6%, 6%, and -4% in March 2008, June 2008, September 2008, December 2008, and March 2009, respectively. Similarly, total loan portfolio also contracted by 4% from December 2008 to March 2009.

Including interbank loans (IBL) and loans arising from repo, the loan portfolio declined by only 1% (QoQ). This was due to the robust growth of IBL and loans arising from repo (16% and 11%, respectively). With regard to IBL, there was a significant growth in all counterparties – 17% to residents and 16% to non-residents. This was in contrast to the 30 % decline in IBL to non-residents from March 2008 to December 2008⁹, and may signal a waning risk aversion towards non-resident banks.

Meanwhile, loan quality of the banking system has improved compared to the previous year. Non-performing loans (NPL) ratio¹⁰ as of end-March 2009 stood at 5.43%, which was lower than the year-ago level of 6.52%. Moreover, all NPLs to major counterparties declined YoY except loans to individuals which grew by 20%. Compared to the

7. For this analysis, unless otherwise specified, the Philippine banking system refers to the Philippine universal and commercial banking system (UKBs). The UKBs make up the bulk of the Philippine banking system (89.5 % of assets as of 4th quarter 2008), and generally drives developments in the whole system.

8. Excluding interbank loans and gross of allowance for credit losses.

9. In the same period, IBL to residents grew by 95%, making its share to total IBL jump from 6% to 15%.

10. Excluding interbank loans and loans arising from repo. NPL definition used follows the definition under Circular No. 202, dated 27 May 1999.

previous quarter, however, NPL ratio for end-March 2009 was higher than the end-December 2008 level of 5.11%. Also, QoQ growth of NPLs to major counterparties showed an increase in NPLs to private corporations and individuals.

Among the major loan counterparties, loans to individuals were a major source of vulnerability. First, NPL to individuals grew at a faster rate than total lending (YoY and QoQ). If this trend persists, the NPL ratio of loans to individuals would continue to rise and consequently drag down the overall NPL ratio of banks considering that this counterparty captured the second biggest portion (13%) of the portfolio. The growth of NPL to individuals has been driven by NPL for housing purposes and credit card receivables. The two registered growth rates of 77% and 42%, respectively.

Second, comparing the past due plus NPL ratio and NPL ratio of loans to individuals showed a difference of 2.39 percentage points. This means that there is still a large amount of past due loans to individuals that could potentially turn into NPLs. This is especially a concern if the domestic households' ability to pay would ultimately be affected by a slowing domestic economy. Loans to private corporations were also showing signs of weaknesses. First, the growth of these loans decelerated in the past year. Second, the QoQ growth rate for March 2009 of NPL to private corporations was significantly higher than the growth rate of total lending.

Meanwhile, real estate loans (RELs) which comprised 11.40% of total loan portfolio exhibited an alarming development. Past due RELs which registered negative growth¹¹ since the third quarter of 2002 up to second quarter of 2008, posted robust growth starting the third quarter of 2008 (13.59%, 2.01% and 14.49% in September 2008, December 2008 and, March 2009, respectively). This growth was caused by an upsurge in past due residential real estate loans (76% in March 2009). Past due commercial real estate loans on the other hand, declined by 3.2% in the same period.

11. Year-on-year growth

4.2.2 Market Liquidity

The banking system has sustained its liquidity position amid the financial market turmoil. Liquid assets¹² to total assets ratio was robust at 30% as of end-March 2009, which was the same as the ratio a year ago. National government securities and due from banks comprised 53% and 41%, respectively, of the liquid assets.

In terms of funding, deposits which accounted for 74% of assets have continued to be the foremost source. Compared to end-March 2008, deposits expanded by ₱614 billion (20%) in the first quarter of 2009, with time and demand deposits substantially fueling such growth. In addition, loans to deposits ratio was sound at 63%. Excluding lending to and deposits from banks, loans to deposits ratio was even lower at 47%.

The Philippine banking system remained adequately capitalised. However, the capital adequacy ratio (CAR) went down to 13.68% as of end-December 2008¹³ from the 15.47% registered as of end-June 2008. It should be noted that the banking system's CAR has been declining since end-December 2007.

4.2.3 Qualitative Measures

Banks' weaker capital position and increased vulnerability to further impact from the global financial crisis have been reflected in the results of a simple macro-stress testing¹⁴ done on selected banks. The stress test used the same sample of banks (the top 10 banks, which make up more than 75% of the banking system's assets, loans and deposits) used in the last FSR. The same scenario was also used – 20% of performing loans become NPL and a 25% decline in net interest income¹⁵. While the previous stress test (using June 2008 data) resulted in only a 250 bps reduction in the sample banks' CAR, the latest stress test (using December 2008 data) resulted in a 370 bps decline. The "stressed" CAR of 8.4 % is also now below the regulatory minimum of 10%.

In addition, while the previous stress test resulted in only one bank falling below the minimum CAR of 10% (and only marginally lower at

12. Cash plus due from banks plus national government securities.

13. Based on preliminary figures.

14. Macro-stress testing methodology used is based on the IMF Stress Tester 2.0.

15. Both are higher than what happened as a result of the Asian crisis – NPL ratio reached a high of 17.4% in 2001 and the largest decline in net interest income was registered in 1999 at 20.2%.

9.9%), the latest results showed five banks falling below the minimum. The five banks' "stressed" CARs are 8%, 6.7 %, 7.8%, 9.6%, and -13.7%¹⁶. The five banks combined contribute more than half of the banking system's assets, loans, and deposits.

4.3 Factors Affecting Liquidity Risk

4.3.1 Macroeconomic Factors

A major economic factor that could possibly affect liquidity risk is the financial system and banking system capabilities to absorb and implement the various reforms and amendments created by the Bangko Sentral. Another factor would be the deposit insurance extended to accounts not exceeding ₱500,000.00 for all deposits. Moreover, the overshooting of the fiscal deficit targets for 2009 and projections for year 2010 are considered to be another factor for liquidity risk, as the Philippines remains under the "fiscal dominance" hypothesis.

4.3.2 Microeconomic Factors

A possible microeconomic factor would be the possible amendments to the payment and settlement system in the Philippines, particularly the reform on making the BSP as the main regulator and authority in ensuring an efficient payment and settlement system. Also considered are transactions between banks and financial institutions as factor components when conducting bank stress-testing and macro-level stress-testing exercise.

5. Liquidity Risk Management in Banking

5.1 Past Developments

The BSP decided to adopt the consolidated supervision approach as early as 1998. Under the set-up wherein banks and quasi-banks comprising a group are distributed to the different examining departments according to their industry classification (i.e., universal banks, commercial banks, thrift banks and rural banks), the initial step taken was to use a common cut-off date for examination of banks and their subsidiaries/affiliates under BSP supervision. This entailed close coordination among the examining

16. The fifth bank with a "stressed" CAR of -13.7% already has a baseline CAR of -12.2%. This results from the bank's large unsecured credit accommodations to its affiliates, which are deductible from capital.

departments. A major limitation, however, was the fact that subsidiaries, affiliates and parent companies of banks or quasi-banks were not examined, since the other subsidiaries and affiliates of banks are primarily regulated by the Securities and Exchange Commission as well as the Office of the Insurance Commission under relevant laws.

In July 2001, the Philippines formally adopted the risk-based adequacy requirement based on the 1988 Basle Capital Accord, in accordance with Section 34 of the General Banking Law of 2000. Initially covering only credit risks, this new capital adequacy ratio is set at 10% (which is higher than the 8% Basle minimum requirement). Last November 7, 2002, the Monetary Board approved the guidelines on market risk capital charge. Although the new guidelines will only cover universal and regular commercial banks, some financial institutions such as thrift banks and quasi-banks will effectively be covered because of consolidated reporting. The domestic financial system is some distance away from the ideal as it remains vulnerable to external shocks. The present situation reflects, to some extent, the lingering effects of the 1997 Asian financial crisis.

5.1.1 Poor Asset Quality

The banking system is hobbled by the heavy baggage of NPAs from the 1997 crisis. The overhang in the non-performing assets (NPAs) which the banking system carries is a lingering concern to the BSP. It weakens the balance sheets of banks and reduces available credit for investments. The weakened state of the banking system combined with uncertain developments here and abroad, would make the system much more vulnerable to shocks and contagion effects in the event of bank failures.

5.1.2 Slowdown in Bank Lending

Reflecting both the deterioration in asset quality as well as the slowdown in economic activity, bank lending declined following the crisis. In particular, commercial bank lending deteriorated significantly from a year-on-year growth of 51.9% in 1996 to a 14.5% contraction in 1998, before showing slight expansions beginning in 1999.

5.1.3 Rising Risk Exposures

Deregulation, technological progress, financial innovation, changing tastes and demographics and increasing market competition have

all combined to dramatically transform the financial services industry. This is a continuing and dynamic process. As a result, the banking industry has no choice but to reinvent its products and services and how these are delivered to customers to stay competitive. However, while these developments have opened new doors of opportunities, they have also added depth to credit, market and liquidity risks facing the financial system.

5.1.4 Underdeveloped Capital Market

Another major concern of the BSP is the continued underdevelopment of the domestic capital market. The country's debt securities market remains almost synonymous with the market for government securities since public debt issues captures over 90% of the market for debt instruments. The corporate bond market is virtually non-existent. With the debt securities market mainly a fund-generating market for the government and the equities market a virtual mirror of conditions from within and outside the system, the traditional loan market remains as the market of choice for both providers and users of capital funds. Because of the underdeveloped state of the domestic capital market, the banking system has been bearing a disproportionate burden of financing economic development as well as fiscal deficits that has rendered the system highly vulnerable.

5.2 Current Practices

The BSP continued to strengthen its regulatory and prudential standards in line with international norms. These initiatives are aimed at promoting market discipline, greater transparency and reducing moral hazard.

During the year, new guidelines were put in place to govern the operation of unit investment trust funds (UITFs). Among others, the new guidelines required all UITF trustees to provide a list of prospective and outstanding investment outlets available for the review of all UITF clients as part of the minimum disclosure requirements in the trust agreements drawn by trustees for each UITF. The changes were intended to ensure that the investing public is well-informed of the returns and the general as well as specific risks associated with each type of fund product offered (Circular No. 593 dated 8 January 2008).

As a complementary move, penalties were likewise amended to encourage banks/non-bank financial institutions (NBFIs) with authority to engage in trust and/or investment management activities and/or officers to comply with the basic security deposit for the faithful performance of trust, investment management and other fiduciary duties (Circular No. 617 dated 30 July 2008).

In addition, the BSP imposed a single 20% overall limit on the exposure of universal and commercial banks (U/KBs) to the real estate industry. The new limit, which primarily serves as a prudential safeguard against the overconcentration of credits of U/KBs to commercial lending, is expected to provide greater flexibility in delivering credit to high priority areas, such as infrastructure development and the construction of residential properties (Circular No. 600 dated 4 February 2008).

The rules and regulations governing the derivatives activities of banks and trust entities were likewise amended in 2008. The revised regulations expanded the range of available derivatives products for banks and their clients and, at the same time, strengthened the supervisory and risk management frameworks for derivatives activities. Safeguards were also put in place to protect the investing public by providing sales and marketing guidelines, including client suitability procedures and risk disclosure requirements for banks offering derivatives products to clients (Circular No. 594 dated 8 January 2008).

To facilitate the recapitalisation of banks undergoing rehabilitation, the BSP issued guidelines on the issuance of capital notes that will qualify as interim Tier 1 capital. Central to the qualifying guidelines is that the Philippine Deposit Insurance Corporation (PDIC) shall be the holder of the said capital notes and that any transfer from PDIC of said capital notes shall require prior BSP approval (Circular No. 595 dated 11 January 2008).

The BSP likewise amended the guidelines for identifying and monitoring problem loans and other risk assets and for setting up allowance for probable losses. The amended regulation excluded from adverse qualitative classification of loans of Philippine branches of foreign banks to subsidiaries and affiliates in the Philippines of multinational companies (Circular No. 603 dated 5 March 2008).

6. Issues and Lessons Learned

6.1 Liquidity Management before the Global Financial Crisis

Philippine banks recorded a solid performance in terms of asset quality, capital position and profitability in 2007. Banks' performance during the year was shielded from the global financial stresses, as they reported no exposures in structured products such as collateralised debt obligations (CDOs) and credit link notes (CLNs) where the underlying assets are credit risky like subprime mortgages in the US. Exposure to the CDO market was a minuscule 0.2% of the total banking system's assets, none of which have subprime mortgages as underlying assets.

The banking system's asset quality showed further improvement while its capital adequacy ratio remained above local regulatory and internationally prescribed levels. As of end-December 2007 with the average capital adequacy ratios (CAR) remaining strong at 14.7% on a solo basis and 15.7% on a consolidated basis. Both were higher than the BSP's 10.0% required minimum ratio and the BIS' 8% requirement.

The banking system's asset quality continued to improve in 2008 in spite of the high inflation environment, high global oil and commodity prices, and increasing interest rates. The non-performing loan (NPL) ratio easing further to 4.7% as of end-May 2008 compared to 5.8% a year ago. As of June 2008, NPL ratio of universal and commercial banks reached 4.0%, which was lower than the 5.2 registered last year, and the lowest since the onset of the 1997 Asian crisis.

With regard to exposure to Lehman, seven local banks reported exposure equivalent to 0.4% of total assets as of 30 June 2008. Two of the top domestic banks have reported to the Philippine Stock Exchange, Inc. that they have set aside provisions totaling US\$94.7 million to cover their exposure to Lehman. Both banks expressed optimism that they could still post reasonable earnings for the year. Trading income of banks, however, was affected by gyrations in equity and bond prices. Data for the first quarter show that the trading income of universal and commercial banks was adversely affected by market volatility.

The financial system's resiliency in spite of the financial market turbulence was boosted by reforms pursued after the 1997 Asian crisis to enhance the financial sector's capacity to withstand shocks. The more prudent regulatory environment set the tone for banks and non-banks to take

a more cautious stance in their operations. A package of banking reforms was implemented in the areas of risk management, corporate governance and competition. These reforms ushered new banking rules such as those relating to the Basel II risk-based capital adequacy framework, corporate governance, Financial Reporting Package (FRP) aligned with International Accounting Standards, credit exposure limits and transparency.

Regulatory guidelines pertaining to investments in structured products by universal and commercial banks (U/KBs) with regular and derivatives authority were issued in 2005.¹⁷ Banks' investments in structured products such as credit-linked notes account only for a modest 2% of banks' assets.¹⁸ Almost half of banks' investments are in safe and marketable government securities.

Credit risks remained subdued. Policy measures were implemented to manage credit risks include those governing DOSRI loans, single borrowers, real estate loans and loan concentration. The growth in the loans outstanding of banks from 2002-2005 ranged from 2.5% to 3.4% due to weak demand for credit due to excess production capacity and the shift to less capital-intensive, services industry. Lending activity accelerated to 11.2% in 2006 and 9.3% in 2007.¹⁹ Universal and commercial banks' loans to the real estate sector were below the 20% cap prescribed by the BSP. From 2001-2007, the share of real estate loans to total loans was below 11%.²⁰ The leverage ratio of banks remained modest, as loans-to-deposit ratio fell below 100% from 2001 to 2008. From 2001 to March 2008, the ratio peaked at 82.1% and the lowest recorded during the period was at 69.4% in 2006. Banks' credit operations are expected to be dampened if the resulting economic slowdown worsens.

17. Based on a survey of individual banks

18. Securitisation structures are financial structures per currency basis through its multi-currency subsidiary ledger; ability to merge and monitor price risks for the whole derivatives portfolio to ensure continuous assessment of the effectiveness of the hedge; and ability to monitor counterparty risks.

Total loans include reverse repurchase agreements.

Excludes reports of banks' trust department where the cash flow comes from an underlying pool of exposures. License to engage in derivatives transactions may be granted to financial institutions supervised by the BSP which meet the following requirements, among others: ability to account for its currency exposures on a per currency basis through its multi-currency subsidiary ledger; ability to merge and monitor price risks for the whole derivatives portfolio to ensure continuous assessment of the effectiveness of the hedge; and ability to monitor counterparty risks.

19. Total loans include reverse repurchase agreements.

20. Excludes reports of banks' trust department.

6.2 Liquidity Situation after the Global Financial Crisis

Domestic liquidity remained sustainable, as M3 grew steadily at 12.0% in November 2009. Also, bank lending continued to expand by 6.0%, driven primarily by outstanding loans from commercial banks. These figures reflect that the liquidity situation remains resilient, as ample funds remain available to support credit needs of both firms and households.

Nonetheless, once liquidity and credit conditions arrive at pre-crisis levels, the BSP, on its part, shall act promptly in the gradual process of monetary tightening by relaxing first and foremost the liquidity-easing measures established in November 2008. The timing and the magnitude of the exit strategy by the BSP shall broadly depend on favorable market conditions and the level of participation by the private sector to infuse funds and investments into the Philippine financial system.

7. Conclusions and Policy Recommendations

7.1 Concluding Remarks

The banking system has sustained its liquidity position amid the financial market turmoil in 2008. Liquid assets²¹ to total assets ratio was robust at 30% as of the end of the first quarter and remained the same as of end-2008. National government securities and due from banks comprised 50% and 42%, respectively, of the liquid assets.

In terms of funding, deposits which accounted for 73% of assets have continued to be the foremost source. Deposits expanded by ₱598 billion (19%) during the last three quarters of 2008, with time and demand deposits substantially fueling such growth. In terms of currency, foreign currency and peso deposits both registered robust growth of 22% and 19%, respectively. In addition, loans-to-deposits ratio was sound at 68%. Excluding lending to and deposits from banks, loans-to-deposits ratio was even lower at 56%.

Macroeconomic developments are expected to play a crucial part in the movement of ROP prices and spreads. The ability to post higher GDP growth figures and the achievement of a balanced budget are news that would be closely watched by investors during the year. The inability to post favorable budget figures may raise the potential for bond yields to

21. Cash plus due from banks plus national government securities.

increase on the back of sovereign credit risk implications of NG's proposed economic stimulus packages and government bank guarantees.²²

7.2 Outlook and Policy Directions

The Philippine banking system is expected to remain sound and stable for the rest of the year as key performance indicators continue to reflect sustained core balance sheet strength: double-digit expansion in resources (11.5%, May 2009), double-digit loan growth (10.2%, May 2009), strong growth in deposit base (10.2%, May 2009), ample liquidity (i.e., loans-to-deposit ratio at 69.1%, March 2009), below pre-Asian crisis non-performing loan (NPL) ratio (4.3%, May 2009) and above-standard capital adequacy ratio (15.5%, December 2008). In large part, this positive outlook is supported by the economic and financial buffers built as well as the banking reform measures implemented over the years.

The BSP will continue to work on reforms aimed at further strengthening the banking system. Banking sector policies will continue to be geared towards improving the regulatory framework, mindful of the need to protect consumers and investors. Key financial and banking sector reforms will be sustained in pursuit of greater efficiency, better risk management, stronger capital base, improved disclosure and transparency practices, and enhanced corporate governance standards in the banking system. Future policy thrust will also focus on maintaining financial sector health through stronger policy actions; supporting demand through macroeconomic stimulus; keeping external sector vulnerabilities and soft spots as limited as possible; and supporting cash-strapped financial institutions by providing lines of credit and by ensuring there is enough liquidity in the system.

22. The country posted a budget deficit of ₱68.1 billion in 2008, the biggest in three years. It also widened its 2009 deficit estimate to ₱177.2 billion, or 2.2% of gross domestic product, from a target of ₱102 billion.

Table 1. Banking Sector Indicators, 2003-07**(End of year; unless otherwise indicated)**

	2003	2004	2005	2006	2007 Q2
Capital Adequacy					
Total capital accounts to total assets	13.1	12.6	12.0	11.7	11.5
Capital adequacy ratio (consolidated basis)	17.4	18.7	17.8	18.5	19.3
Asset Quality					
NPL ratio 1/	16.1	14.4	10.3	7.5	7.0
NPA ratio 2/	13.2	11.8	9.1	6.9	6.4
Distressed asset ratio 3/	27.0	25.3	20.0	15.8	15.1
NPL coverage ratio 4/	51.5	58.0	73.8	75.0	74.8
NPA coverage ratio 5/	30.9	33.2	39.2	37.3	36.5
Profitability					
Return on assets 6/	1.1	0.9	1.1	1.3	1.3
Return on equity	8.5	7.1	8.7	10.6	11.6
Cost-to-income ratio 7/	68.9	69.8	67.3	66.5	65.5
Liquidity					
Liquid assets to deposits	47.9	53.2	53.0	52.0	54.4
Loans (gross) to deposits	80.3	73.4	72.5	69.4	65.1

1/ Non-performing loans (NPL) ratio (excluding IBL)

2/ (Non-performing loans + ROPA) over total gross assets

3/ Ratio of (NPLs + Gross ROPA + current restructured loans) to (Gross total loan portfolio + Gross ROPA)

4/ Ratio of loan loss reserves to NPLs

5/ Ratio of valuation reserves (for loans and ROPA) to NPAs

6/ Average net income after taxes over average assets

7/ Operating expenses (net of bad debts and provisions) to total operating income

Sources: Philippine authorities and Fund staff calculations

Note: ROPA= Real and Other Property Acquired. ROPA is a measure of the stock of foreclosed properties held by a bank.

Annex 1. Liquidity in the Government Bond Market

Market liquidity generally refers to the ease with which assets may be converted to cash without materially affecting prices and may be “measured” by the volume of done transactions and the movement of prices with respect to the volume. In the Philippines, the volume of transactions of the different financial markets have been growing remarkably in the past three years, with the swap market expanding by around 275%. The increase may be attributed to positive macroeconomic fundamentals as well as several market initiatives to create reliable market infrastructure to facilitate trading and settlement (e.g., RTGS, BTR-ROSS and FIE), which have improved investor confidence and increased liquidity in the Philippine financial markets.

Average Daily Market Volume

Market	2006	2007	2008	% Change from '06 to '08
GS (₱ million)	3,240	6,410	7,867	142.8
FX Spot (\$ million)	458	526	672	46.7
FX Swap(\$ million)	152	377	569	275.1
Equities (₱ million)	2,178	5,437	3,081	41.5
Interbank(₱ million)	3,357	4,962	7,993	138.1

Source: BSP

Aside from the volume of transactions, the following elements of a liquid market may be observed in the Philippine financial markets:

i. **Tightness** – Tightness refers to the bid-offer spread which provides an idea about the costs incurred by market participants in executing transactions. The lower the spread, the higher is the market liquidity. The tightening of the bid-offer spread is very apparent in the government securities (GS) market. In the 1990s to the early 2000s, banks would observe a 50 bps bid-offer spread which the BSP Treasury Department also applied to its pricing of T-Bills. Said bid-offer spread tightened to around two to three bps at the height of the bull run of the GS market in 2007. Currently, subject spread moves around the 10 basis-point range. The bid-offer spread for the peso-dollar market has been historically tight, ranging from two to three cents.

ii. **Depth** – Depth is the ability of the market to handle large transactions without causing sharp changes in prices. In the GS market, the standard trading size is ₱50 million. Before 2004 when the country experienced a “fiscal crisis”, a ₱50 million trade would have moved prices to a new level. Nowadays, the GS market can accommodate transactions up to ₱500 million without significantly moving the price. The same deepening is seen in the peso-dollar market where the standard trading lot is US\$1 million. In the 1990s, transactions amounting to US\$20 million would have brought about an adjustment in prices. However, the improvement in liquidity has raised this volume to US\$50 million.

iii. **Timeliness** – Timeliness pertains to the speed with which transactions can be executed. This dimension of market liquidity has been made possible by the presence of brokers, the availability of facilities which provide for price transparency and the real time settlement of transactions.

iv. **Resiliency** – Resiliency is the speed with which price fluctuations dissipate. Under normal conditions, price fluctuations in the GS market these days will correct within the day unlike in the 90’s when a ₱50 million transaction could mean a permanent shift in price levels.

It may be noted that market liquidity is also contingent on participants’ perception of other factors such as macroeconomic fundamentals, political concerns and other risk events. That is, no matter how strong or well developed a market is, uncertainty or risk aversion could cause liquidity to quickly dry up. Point in case is the strong sell-off in the Philippine debt paper market in the summer of 2006 when market sentiment was adversely affected by the lack of transparency of UITF investments. At the height of the sell-off, market bid-offer spreads, which had narrowed to two to three basis points previously, widened to as much as 400 bps.

Further, it is important to note that an increasing volume of transactions is not an automatic indication of increasing liquidity. For example, the volume of done trades in Philippine interbank market has been increasing in the last three years. However, all other aspects of a liquid market are not evident. Firstly, there are very few interbank players because market participants prefer the swaps market which is collateralised, i.e. peso borrowings are backed by US dollars. Secondly, most interbank transactions only happen late in the day after banks get their clearing balances. Thirdly, limited credit lines may create distortions in the rates. That is, a bank that is considered a “poor credit” may only borrow funds at substantially high rates.

LIQUIDITY MEASUREMENT AND MANAGEMENT
IN SRI LANKA

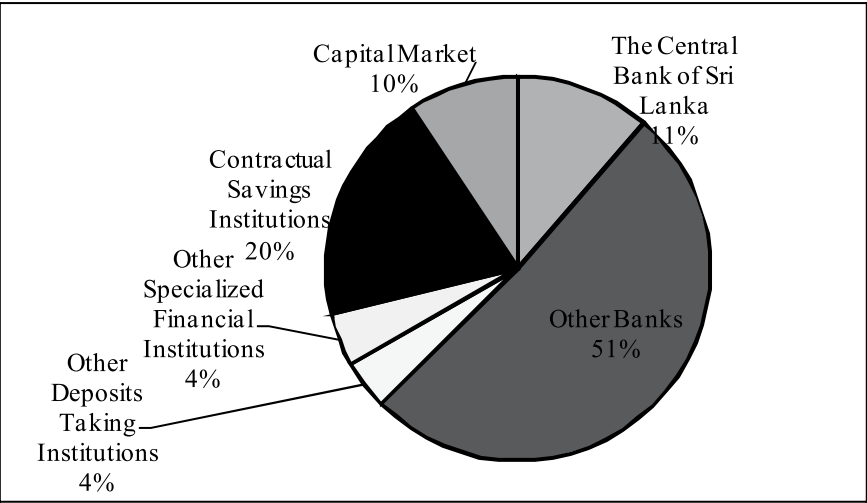
by P. D. R. Dayananda¹

1. Overview of Financial System and Commercial Banking
Industry in Sri Lanka

1.1 Introduction

The financial system in Sri Lanka comprises the money market and capital market. The major players of the money market are banks, finance companies, leasing companies, primary dealers, pension and provident funds, insurance companies, rural banks, merchant banks, unit trusts and thrift, and credit co-operative societies. While the equity market is playing a pivotal role in the capital market, the bond market is nascent. Figure 1 below shows the composition of the financial system of Sri Lanka as of end-December 2008.

Figure 1
Composition of Financial System of Sri Lanka



Source: Annual Report, Central Bank of Sri Lanka.

1. Senior Assistant Director, Department of Bank Supervision, Central Bank of Sri Lanka.

1.2 Commercial Banking Operation in Sri Lanka

The banking system in Sri Lanka originated early in the 19th century. The Bank of Kandy was established in Kandy in 1828 as the first bank in Sri Lanka. With increasing demand for banking services, the Exchange Bank of Ceylon, the first bank in the exchange banking system was established in Colombo in 1841. The foreign banks subsequently entered the banking system in Sri Lanka and dominated it with a market share of 60% of banking sector assets. Meanwhile, the Bank of Ceylon was opened in 1939. The establishment of the Central Bank of Sri Lanka in 1950, the apex institution of the banking system, was one of the important landmarks in the development of the banking system in Sri Lanka. Another significant development in the banking system of Sri Lanka was the formation of the state-owned bank (1960s) and locally-incorporated private banks (1970s). The economic reform of 1977, which boosted the banking system in Sri Lanka, saw the establishment of new branches of foreign banks and off-shore banking units and an increase in the number of privately-owned domestic banks.

Several measures stimulated financial liberalisation and promoted the competitiveness, efficiency and stability of the banking system. As a result of the financial liberalisation, there was considerable financial deepening. As shown in Figure 2, the growth of Broad Money (M_2) in relation to the Gross National Product (GNP) doubled to 36.71% in 2001 from 19.03% in 1975. However, what is not immediately apparent is that significant progress has been achieved in increasing the efficiency and competitiveness of the banking industry. The dominance of the two state banks in the commercial banking sector has declined, as can be seen in Figure 2. Sri Lanka has started implementing the core Basle principles on effective banking supervision in 1991 and introduced prudential norms related to risk-weighted capital adequacy requirements, accounting for income recognition and loan loss provisioning, etc.

Figure 2
Indicators of Financial Deepening and Commercial
Bank Asset Structure

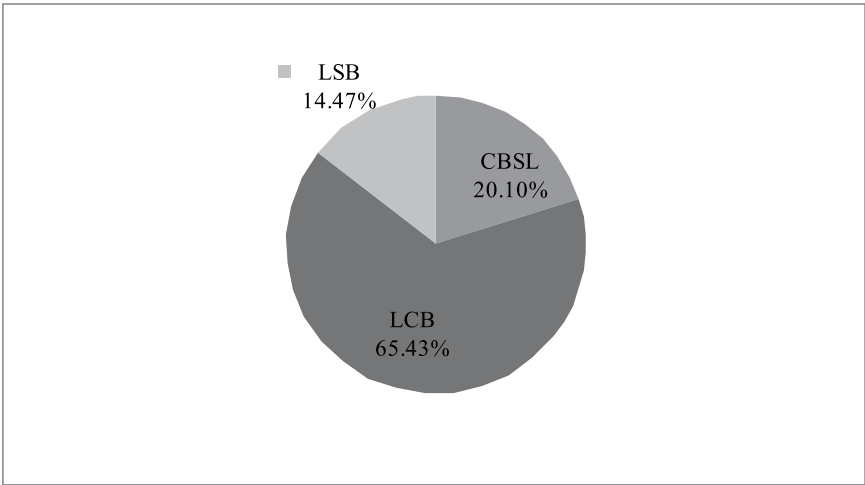
Year	1975	1985	1995	2005	2007	2008
M_2 / GNP	19.03%	33.40%	38.65%	48.31%	51.97%	55.45%
State Commercial Bank assets/Total commercial bank assets	80.30%	69.62%	53.59%	41.89%	40.19%	39.07%

Source: Annual Reports, Central Bank of Sri Lanka.

The major participants in the banking system in Sri Lanka are the Central Bank of Sri Lanka (CBSL), Licensed Commercial Banks (LCB) and Licensed Specialised Banks (LSB). Figure 3 shows the composition of banking assets in Sri Lanka as of end-2008.

The commercial banks in Sri Lanka dominate the banking system accounting for about 65.43% of banking assets² and provide a wide array of financial services including payments and settlement services. There are twenty-three (23) commercial banks. Based on ownership, they are divided into three major categories: State Banks (2), Domestic Private Banks (9) and Foreign Banks (12). At the end of 2008, the two state commercial banks had 39.2% of commercial banks’ assets and the domestic private banks and the foreign banks 45.9% and 14.9%, respectively. Even though the banking sector comprised 23 LCBs, six LCBs account for the major share of the banking sector assets. These LCBs, which are often referred to as systemically important banks (SIBs), consist of two state commercial banks and the four largest domestic private commercial banks. SIBs own about 77.5% of total assets of the commercial banking sector. In terms of deposits, the SIBs held a market share of 82.6% and 68.7% of LCB sector and banking sector deposits, respectively.

Figure 3
Composition of Banking Assets in Sri Lanka – 200



Source: Annual Report -2008, Central Bank of Sri Lanka

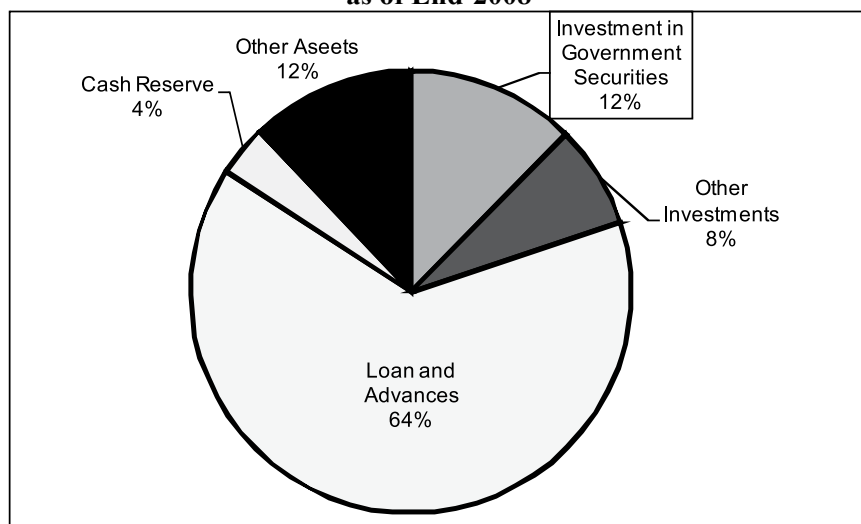
2. Does not include assets in the Central Bank.

The Licensed Specialised Banks (LSBs), the other category of licensed banks, which cater mainly to projects with long gestation periods or strategic sectors for socio-economic development, are relatively less important in comparison to the LCBs, both in terms of size and their impact on the payment and settlement system. These banks account for about 16% of total assets of the banking sector. The contribution of deposits of LSBs to the broad money supply is around 18% compared with 75% by LCBs.

In addition to the banking institutions, there are some contractual savings institutions operating in the country. The Employee Provident Fund, formed in 1958, and the Employees Trust Fund, formed in 1980, together owned an asset base of US\$6.6 billion, and insurance companies comprised US\$1.37 billion of assets as of end-2008. The country has a well developed stock market with higher volatile trading patterns.

1.3 Nature of Commercial Banking Business in Sri Lanka

Figure 4
Uses of Funds of Licensed Commercial Banks Sri Lanka
as of End-2008

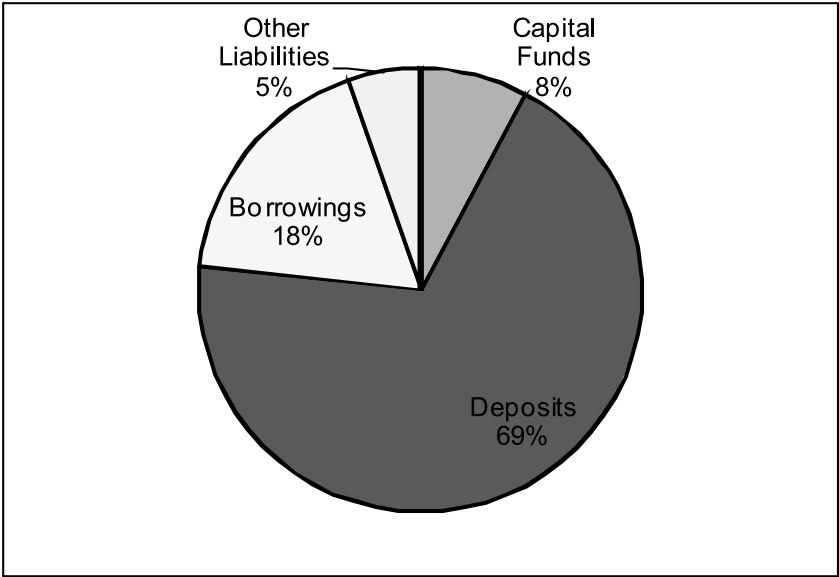


Source: Bank Supervision Department, Central Bank of Sri Lanka

The commercial banks in Sri Lanka mostly engage in traditional banking activities, such as acceptance of deposits and loan extension, and invest mainly in the government securities market as well as engage in other fee-based services. The commercial banking system of Sri Lanka was mainly funded through deposit mobilisation, money market borrowing and

internal capital generation. Commercial banks do not engage in any fund generation through the wholesale fund market. Their share of deposits in the total funding structure is about 69%. Figures 4 and 5 show the uses and sources of funds of the Licensed Commercial Banks in Sri Lanka as of end-2008.

Figure 5
Sources of Funds of Licensed Commercial Banks
in Sri Lanka as at 31.12.2008



Source : Bank Supervision Department, Central Bank of Sri Lanka

1.4 Characteristics of Government Bond Market in Sri Lanka

The bond market of Sri Lanka comprises the government (Treasury) bond market, which has been operating for almost two decades, and the corporate bond market. The CBSL is responsible for the issuance and management of the government bonds on behalf of the Government of Sri Lanka. Accordingly, the CBSL issues medium- and long-term government bonds in maturities ranging from 2 years to 20 years. The government bonds are interest-bearing securities, with interest paid bi-annually which are guaranteed by the government and are the safest of all investments, as they are free of default risk. The government bonds are tradable securities which are sold by auction to Primary Dealers, who in turn market the securities to the public. Primary Dealers are institutions appointed by

the CBSL for marketing government securities in the secondary market. Primary Dealers are also responsible for supporting the primary auction and are the major participants in the competitive bidding process. Primary Dealers are required to provide liquidity in the secondary market by quoting bid and offer yields for government securities. All the commercial banks operating in Sri Lanka participate actively in the secondary market for government bonds.

In terms of the ownership of the government bonds, the Employee Provident Fund and savings institutions are the major players in the government bond market in Sri Lanka from 2002 to September 2009. The corporate bond market is in the early stage of development and accounts for only 2% of the total bond market in Sri Lanka.

1.5 Regulations and Restrictions Regarding Banks' Business Activities

The Central Bank of Sri Lanka, as the regulator and the supervisor of banks in Sri Lanka, enforces several regulations in the operation of commercial banks. The following are some of the major prudential measures:

- Prudential minimum capital adequacy ratio;
- Investment in equity market (maximum limit of 10% on banks' capital funds);
- Single borrower limit (30% of capital funds);
- Limitation of investment in commercial paper;
- Statutory Liquid Asset Ratio, minimum 20% of total liabilities (excluding capital funds);
- Agriculture sector lending should exceed 10% of total loans and advances;
- Risk management relating to foreign exchange business of Licensed Commercial Banks;
- Classification of loans and advances, income recognition and provisioning;
- Determination of limits and securities with regard to the granting of accommodation by banks to related parties;
- Limit on foreign participation in the share capital; and
- Corporate governance standards for banks

2. Role of the Central Bank of Sri Lanka

2.1 The Central Bank of Sri Lanka

The core objectives of the Central Bank of Sri Lanka (CBSL) are maintaining economic and price stability and maintaining financial system stability in Sri Lanka. The CBSL is also responsible for currency issue and management. In addition, the CBSL acts as advisor on economic affairs as well as banker to the Government of Sri Lanka (GOSL). On behalf of GOSL, the CBSL, as its agent, is responsible for these four agencies, namely, the management of the Employees Provident Fund, the management of the public debt of Sri Lanka, the administration of the provisions of the Exchange Control Act, and the administration of foreign- and government-funded credit schemes for regional development.

2.2 Supervision and Regulation of Financial System in Sri Lanka

The regulatory framework of the financial system of Sri Lanka brings into play a multiple regulatory system which consists of three major supervisory agencies covering banks, finance companies, leasing companies, government security dealers, stock market and its allied businesses and the insurance companies. As the apex institution, the CBSL is responsible for the stability of the financial system. The CBSL directly engages in the supervision and regulation of the following financial institutions:

- Licensed Commercial Banks and Licensed Specialised Banks.
- Registered finance companies
- Registered finance leasing establishments
- Authorised Primary Dealers in government securities

The CBSL indirectly engages in the supervision and regulation of the capital market institutions and insurance industry institutions. The Deputy Governor in charge of Financial System Stability at the CBSL is a member of the Securities and Exchange Commission (SEC) and the Insurance Board of Sri Lanka (IBSL), supervisory bodies of the capital market and insurance market, respectively. The SEC is responsible for the licensing and regulation of stock exchanges, stockbrokers, stock dealers and unit trust companies, pursuant to the Securities and Exchange Commission of Sri Lanka Act No. 36 of 1987. The SEC also registers underwriters, margin providers, credit rating agencies, investment managers and

securities clearing houses. The IBSL regulates and supervises the insurance industry, i.e. insurance companies and their agents and insurance brokers.

2.3 Regulatory Requirements on Commercial Bank Liquidity, Risk Measurement and Management

The CBSL has mandated that commercial banks measure the regulatory liquidity assets in accordance with Section 86 of the Banking Act, No.30 of the 1988. Accordingly, the CBSL deems the following asset items as commercial bank liquid assets:

- Cash in hand;
- Balance with the commercial banks;
- Money at call in Sri Lanka;
- Cash items in the process of collection;
- Treasury bills and securities issued by the government (maturing within one year);
- Good receipts;
- Import bills;
- Export bills;
- Inland bills;
- Treasury bonds;
- 50% of investment in commercial paper backed by standby credit line of the commercial banks or issued by the high investment-grade-rating corporations;
- Sri Lanka Development Bonds; and
- International Sovereign Bonds issued by the Government of Sri Lanka.

As a commercial bank regulator, the CBSL has imposed two major regulatory measures on commercial bank liquidity risk management namely, the Statutory Reserve Requirement (SRR) and Statutory Liquidity Asset Ratio (SLAR).

2.3.1 Statutory Reserve Requirement (SRR)

The commercial banks operating in Sri Lanka are required to maintain reserves with the Central Bank at rates determined by the Bank. At present, demand, time and savings deposits of commercial banks denominated in rupee terms are subject to the SRR and the applicable ratio is 7% on all deposit liabilities. However, the CBSL does not pay any interest on the SRR. The CBSL uses the SRR as a measure of day-to-day

monetary management rather than a prudent liquidity risk management measure. However, the reliance on the SRR as a measure of monetary management has been gradually reduced with a view to enhancing market orientation of monetary policy and also reducing the implicit cost of funds which the SRR would entail on commercial banks.

2.3.2 *Statutory Liquidity Asset Ratio (SLAR)*

The commercial banks in Sri Lanka are required to maintain 20% of liquidity assets on their liabilities, excluding capital funds. Since this ratio is a statutory requirement, non-compliance would result in a penalty for the commercial banks.

In addition, the commercial banks operating in Sri Lanka are required to report the contractual maturity of their assets and liabilities on a monthly basis to the CBSL through the submission of web-based returns. Accordingly, the CBSL monitors the liquidity risk in commercial banks in Sri Lanka through the SLAR and the performance of maturity-gap analysis on a monthly basis through its off-site surveillance system. In the course of on-site examination, conducted once every two years, the CBSL also appraises the liquidity risk management process of the commercial banks to assure that the availability of resources is commensurate with their liquidity risk.

2.4 The Role of CBSL as a Liquidity Provider

The role of the CBSL as a liquidity provider to the commercial banks is directly related to its core objectives of price stability and financial system stability. The monetary policy framework of the CBSL is basically based on the reserve money target (RMT) to achieve the price stability. The main monetary policy instruments currently used are policy interest rates and Open Market Operations (OMO), and the Statutory Reserve Requirement (SRR) on commercial bank deposit liabilities. The key elements of the OMO system are an interest rate corridor formed by the main policy rates of the Bank, i.e. the repurchase rate and the reverse repurchases rate, a daily auction either to absorb or inject liquidity, a standing facility at interest rates at the bounds of the corridor and outright transactions. As a supervisory and regulatory authority, the CBSL provides credit to commercial banks as a lender of last resort. In providing liquidity to the commercial banks, the CBSL adopts different methodologies in normal time and crisis time.

2.4.1 Liquidity Provisions by the CBSL – Normal Time

The CBSL facilitates the commercial banks to meet their liquidity requirements through the active OMO system with the following key elements:

2.4.1.1 Daily Auction

The CBSL conducts daily auction to inject liquidity for the commercial banks through reverse repurchase transactions if there is a shortage of liquidity, and thereby maintaining the stability of the overnight interest rates around a level considered consistent with the path of reserve money targets. The auction is on a multiple bid, multiple price system. Commercial banks could make up to three bids at each auction and the successful bidders would receive their requests at the rates quoted in the relevant bid.

2.4.1.2 Standing Facility

Standing facilities are available for those commercial banks which are unable to obtain their liquidity requirements at the daily auction. If a participant needs liquidity to cover a liquidity shortage, the bank could borrow funds on reverse repurchase basis under the standing facility. The CBSL has set a limit for the number of transactions per month for individual banks effective January 2007, and has continued it till May 2009, with subsequent changes made as to the number of transactions. The banks could borrow from the CBSL under this facility exceeding the number of transactions per month by paying a penal rate of interest. However, CBSL would carefully scrutinise the request of liquidity by the commercial banks on a case-by-case basis.

2.4.2 Liquidity Provisions by CBSL – Crisis Time

The CBSL is liable to provide credit to commercial banks as a lender of last resort. In periods of emergency or of imminent financial panic which directly threatens financial system stability, the CBSL may grant commercial banks and may renew extraordinary loans or advances secured by collateralised loans or government securities. The CBSL charges a penalty rate on these facilities which is higher than the other market rates. A commercial bank to which a lender-of-last-resort facility is provided shall not expand the total volume of its loans and investments except with the prior approval of the CBSL.

3. Dynamics and Determinants of Market Liquidity in Sri Lanka

3.1 Market Liquidity Measurement in Sri Lanka

Market liquidity is generally defined as the ability of the participating institutions in the financial market to exchange their financial assets quickly without any material effect on prices/costs. In Sri Lanka, we refer to the additional funds available within the commercial banks operating in Sri Lanka. All commercial banks operating in Sri Lanka maintain cash balances with the CBSL for settlement purposes and to meet the Statutory Reserve Requirements (SRR). The market liquidity refers to the aggregate balance held by commercial banks on their settlement accounts at the CBSL and the additional effect of the transactions of the CBSL with the government and commercial banks.

The CBSL takes into account the balance held by commercial banks on their settlement accounts at the CBSL as a main measure of the market liquidity in Sri Lanka which implicitly states the excess or deficit of the market liquidity. The market would be operating with ‘excess market liquidity’ on a given day, if banks’ cumulative aggregate deposit balance with the CBSL is higher than the balance banks would need to maintain on account of SRR. On the other hand, the market would be operating with ‘deficit market liquidity’ on a given day, if banks cumulative aggregate deposit balances with the CBSL is less than the balance banks would need to maintain on account of SRR.

As a first assessment of the market liquidity that is performed at an early hour of the working day, the CBSL aggregates the excess funds available at the settlement accounts of commercial banks at the CBSL that the commercial banks would need to meet their SRR. Then CBSL takes into account the liquidity enhancing and reducing factors and estimates the market liquidity. The following main factors have been considered as enhancing and as reducing market liquidity by the CBSL:

Market Liquidity Enhancing Factors

- CBSL purchases of T Bills
- CBSL purchases of FX in the market
- Foreign loan receipts to the government which are sold to the CBSL
- Currency deposits with the CBSL
- Release of CBSL profit to the government

- Increase in the limit on provisional advances to the government

Market Liquidity Reducing Factors

- The CBSL sales of T Bills out of its holding in secondary market
- Releasing the CBSL holding of T Bills
- CBSL sales of FX in the market
- Foreign loan repayments handled by CBSL
- Currency withdrawals from the CBSL

3.2 Market Liquidity Management in Sri Lanka

The CBSL regards the level of the market liquidity as a complement for the active open-market operation that is used as a main instrument of monetary policy to stabilise the market interest rate. Therefore, the market liquidity management in Sri Lanka is directly connected to the monetary management strategy of the CBSL. Accordingly, the CBSL employs monetary management strategy and tools (SRR and OMO) in the management of market liquidity in Sri Lanka.

The CBSL measures the market liquidity on a daily basis by considering several factors that can affect the domestic market liquidity. Upon assessment of the daily market liquidity, the CBSL would know the level of the market liquidity and whether it is in balance, excess or deficit. The level of market liquidity would determine the liquidity management strategy applicable which is basically based on the following framework.

3.2.1 If Market Liquidity is in Balance

- Deficit commercial banks could borrow from surplus commercial banks and at aggregate level there will not create a liquidity surplus or deficit in the market.
- Interbank call market rate would be around the middle of the corridor.
- The rate should be the interest rate consistent with the reserve money targets (RMT).

3.2.2 If a Market Liquidity Deficit Emerges

- Interbank call market rate would move towards the upper bounds of the corridor.
- The CBSL would normally prevent such an upward movement by injecting liquidity to cover the deficit.

3.2.3 If a Money Liquidity Surplus Emerges

- Interbank call market rate would move towards lower the bounds of the corridor.
- The CBSL would normally prevent such downward movement in interest rates by absorbing the surplus liquidity.
- If there are early indications that the corridor is not consistent with RMT, the CBSL may let the interest rate move up/down within the corridor, as appropriate.

The CBSL applies the key elements of the OMO system as major tools for market liquidity management in Sri Lanka. The application of these tools by the CBSL would enable it to manage short- and long-term market liquidity in Sri Lanka as explained below.

3.2.4 Daily Auction Either to Absorb or Inject Liquidity

A daily auction is conducted either to absorb liquidity through repurchase transactions, if there is excess liquidity, or to inject liquidity through reverse repurchase transactions, if there is a shortage of liquidity, and thereby keeping overnight interest rates stable around a level considered consistent with the path of the reserve money targets. The auction is on a multiple bid, multiple price system. Participants could make up to three bids at each auction and the successful bidders would receive their requests at the rates quoted in the relevant bid.

3.2.5 Standing Facility

Standing facilities are available for those participating institutions (commercial banks), which are unable to obtain their liquidity requirements at the daily auction. That is, even after the daily auction, if a participant has excess money he could enter into a repurchase transaction under the standing facility. Similarly, if a participant needs liquidity to cover a shortage, he could borrow funds on reverse repurchase basis under the standing facility.

3.2.6 *Outright Transactions*

Outright transactions are conducted at the discretion of the CBSL to address long- term market liquidity issues. If a relatively large liquidity surplus exists and is likely to persist for a long period, it is absorbed by selling Treasury bills outright out of the holdings of the CBSL and, if a sufficient stock of Treasury bills is not available, by issuing the Central Bank's own securities. Similarly, a long-term liquidity shortage would be removed by purchasing Treasury bills and bonds in the secondary market and buying Treasury bills in the primary market.

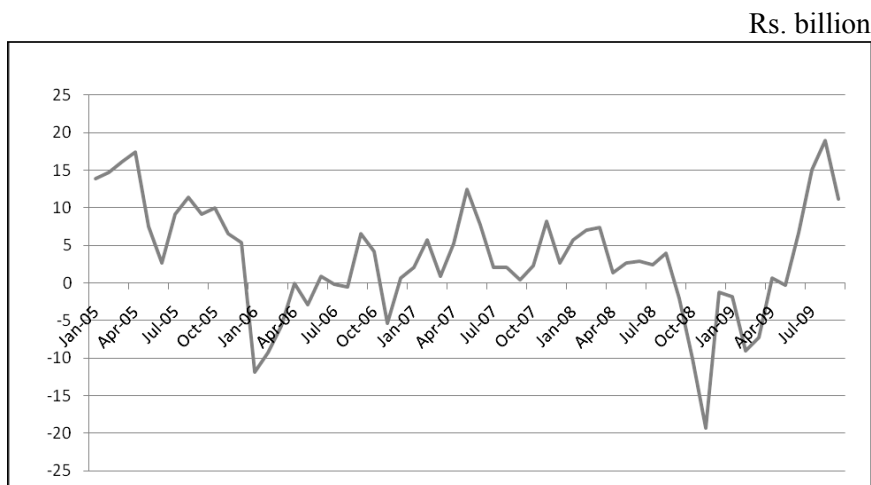
3.3 Market Liquidity Profile in Sri Lanka (2005 – 2009)

Despite the growing consensus about the measurement and management of market liquidity, there is a dearth of literature in the case of Sri Lanka. This study, therefore, uses few quantitative and qualitative measures to assess the market liquidity profile in Sri Lanka during period from Q₁,2005 to Q₃,2009. Accordingly, the daily estimation of the market liquidity by the CBSL was mainly used to assess the market liquidity profile in Sri Lanka. In addition, the bid-ask spread of government Treasury Bonds, turnover ratio of government bond, liquidity stock in commercial banks and movement of the two stock market indices were the quantitative measures used, and incidents of breaching limits, asset quality, and bank-credit rating were the qualitative measures employed for the estimation of the market liquidity profile in Sri Lanka.

3.3.1 *Daily Market Liquidity Volume Estimated by CBSL*

From the computation of the CBSL, it was found that Sri Lanka has been operating with the excess market liquidity during most of the period under study. However, it uncovered that the deficit market liquidity prevailed during the periods of the first five months of 2006, the last quarter of 2008 and the first five months of 2009. The study exposed the operation of several factors at work that had influenced the year-by- year behavioral pattern of the market liquidity (excess or deficit) in Sri Lanka (see Figure 6). The different influencing factors (including some policy measures) operating behind the market liquidity situation in Sri Lanka by year by year, can be elaborated as follows.

Figure 6
Daily Market Liquidity Volume in Sri Lanka



Source: Annual Reports of Central Bank of Sri Lanka

3.3.1.1 Market Liquidity in 2006

- Except for the first five months of the year, the liquidity in the market was broadly in balance, with the CBSL tightening its monetary policy in response to the inflationary pressure and high credit expansion.
- The CBSL absorbed the liquidity both on a daily and on a permanent basis through aggressive OMOs.
- The total amount absorbed through outright sales auctions was nearly Rs.36 billion as a measure of long-term liquidity management.
- The CBSL discouraged the regular use of Reverse Repo facility by the commercial banks.

3.3.1.2 Market Liquidity in 2007

- There was a large injection of liquidity into the market through inflows of foreign exchange to the government and subsequent sales of these proceeds to the CBSL.
- The CBSL absorbed liquidity on an overnight basis on most days during the first half of the year except for a short period in March and April.
- The CBSL absorbed liquidity through outright sales auctions up to nearly Rs. 111 billion as a permanent measure of its long-term liquidity management.

3.3.1.3 Market Liquidity in 2008

- The money market had excess liquidity during most of the first eight months of 2008, mainly due to:
 - The influx of foreign exchange through foreign investments in government securities; and
 - An increase in the limit on provisional advances to the government by the CBSL.
- Treasury bills amounting to Rs.26.6 billion was sold outright to absorb excess liquidity on a permanent basis.

3.3.1.4 Market Liquidity after September 2008

- The liquidity condition, however, reversed in September 2008, influenced by the worsening liquidity constraints in the global financial markets.
 - High out flow of FX.
 - The government could not obtain foreign financing to the extent expected.
- The CBSL took several temporary measures to mitigate the impact of the shortfall of market liquidity on the domestic money market.
 - The CBSL injected Rs. 24.5 billion through reductions in the SRR by 225 basis points. Currently the SRR ratio is 7%.
 - The CBSL eased the limits placed on the reverse repurchase facility for commercial banks from 3 times to 6 times per calendar month with effect from 2 October 2008, 10 times with effect from 15 October 2008, and subsequently removed the restrictions on number of times with effect from 21 May 2009.

3.3.1.5 Market Liquidity in First Three quarters of 2009

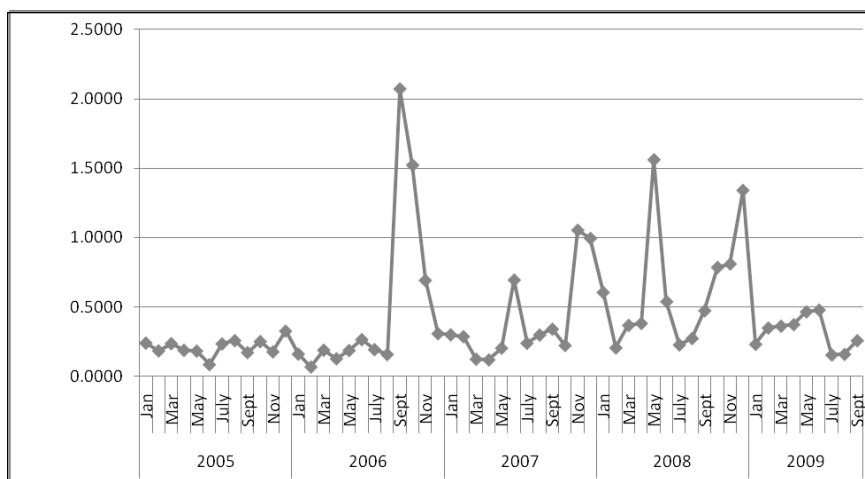
- The deficit market liquidity condition continued till May 2009.
- FX reserve drained continuously.
- Opted for the IMF standby arrangement.
- Reversed the situation by winning the war against terrorism in May.
- Excess Rupee and FX liquidity in the market.
- Issued CBSL security and FX swaps.

3.3.2 *Other Quantitative Indicators to Measure the Market Liquidity*

The bid-ask spread of government bonds, liquidity stock in commercial banks and the three main stock (indices) can be regarded as the other quantitative indicators to measure the market liquidity in Sri Lanka.

The literature on measurement of market liquidity has suggested that the bid-ask spread and market liquidity is negatively correlated that the deficit market liquidity would widen the bid-ask spread of the government bonds. As revealed in Figure 7, the bid-ask spread for 2-year government bonds in Sri Lanka has broadened during the periods of September to November in 2006, November in 2007 to January in 2008, and September to December in 2008. However, the deficit market liquidity position prevailed during the periods of the first five months of 2006, last quarter of 2008, and the first five months of 2009. This has shown that the bid-ask spread of the government bond in Sri Lanka is not a clear indicative measure of market liquidity in Sri Lanka.

Figure 7
Bid-ask Spread of Government Bonds

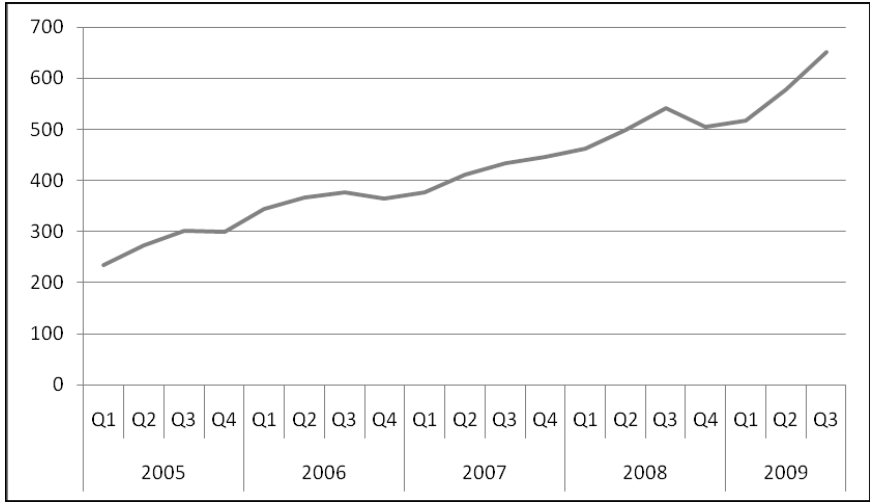


Source: Central Bank of Sri Lanka

The liquidity stocks in commercial banks can also be used as a measure of market liquidity. The liquidity stocks in commercial banks in Sri Lanka have shown a gradual increase over the period under consideration up to the third quarter of 2008 and then it declined till the

middle of the second quarter in 2009. Then, it again started to increase as illustrated in Figure 8. The market liquidity of Sri Lanka was impacted by the global financial market crisis in September 2008. This was reflected in the declining liquidity stocks in commercial banks in September 2008.

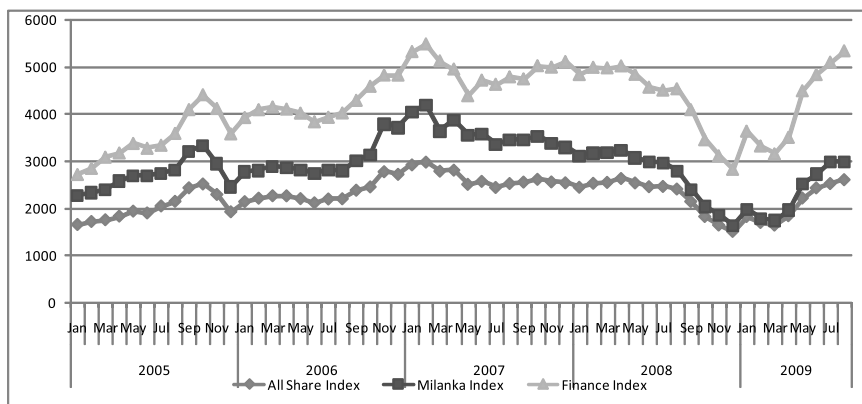
Figure 8
Liquidity Stocks in Commercial Banks in Sri Lanka
Rs. billion



Source: Department of Bank Supervision, Central Bank of Sri Lanka

There are two major stock market indices in Sri Lanka, namely, the All Share Price Index, which measures the movement of share prices of all listed companies, and the Milanka Price Index, which comprises a select group of 25 stocks, a list which is reviewed each quarter. In addition, the study considered the sub-index relevant to the banking and financial sector. The movements of these three indices have shown a common direction over the period under study, and they exhibited an extreme decline in September 2008 in parallel with the declining market liquidity over the same period.

Figure 9
Stock Market Indices in Sri Lanka



Source: Annual Report, Central Bank of Sri Lanka

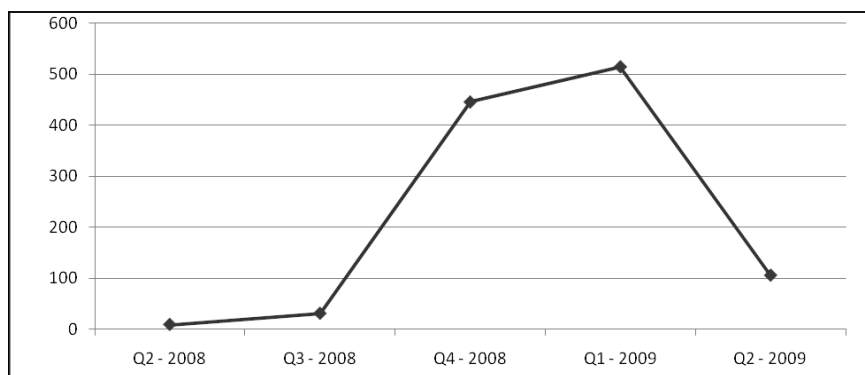
3.3.3 Other Qualitative Indicators to Measure Market Liquidity

This study used the incidents commercial banks availed the standing facilities (OMO) with penal rate of interest during the period under study and asset quality (non-performing loan ratio) for the estimation of the market liquidity profile in Sri Lanka as qualitative measures.

The commercial banks could borrow from the CBSL under the standing facility by exceeding the number of transactions per month (set by the CBSL) paying a penal rate of interest. The commercial banks could enjoy this costly borrowing, if the market is illiquid. The study discovered that the commercial banks in Sri Lanka availed this facility during the period from Q₂: 2008 to Q₂: 2009. This was the period during which the deficit market liquidity existed in Sri Lanka due to the influence of the global financial crisis.

Figure 10
Standing Facilities Enjoyed by Commercial Banks
With Penal Rate of Interest

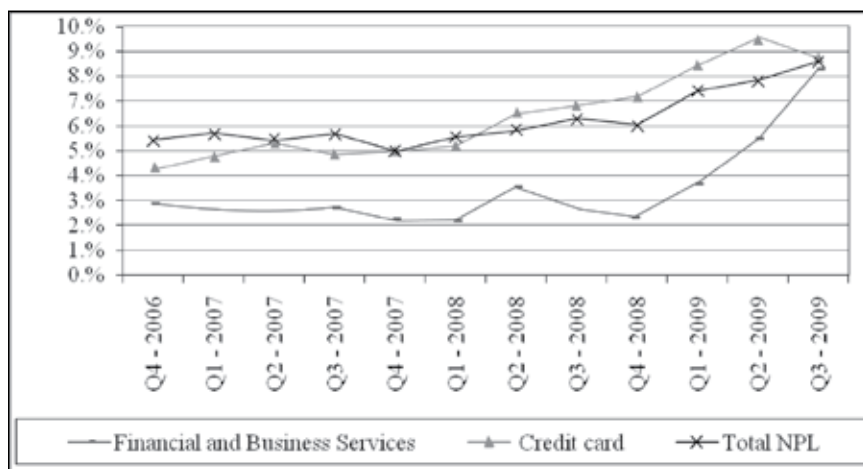
Rs. million



Source: Annual Report, Central Bank of Sri Lanka

As illustrated in Figure 10, the commercial banks in Sri Lanka borrowed from the CBSL under this standing facility paying penal rate of interest amounting to Rs 445 million in Q₄, 2008 and Rs 515 million in Q₁, 2009.

Figure 11
Non-performing Loan Ratios in Commercial Banking System



Source: Department of Bank Supervision, Central Bank of Sri Lanka

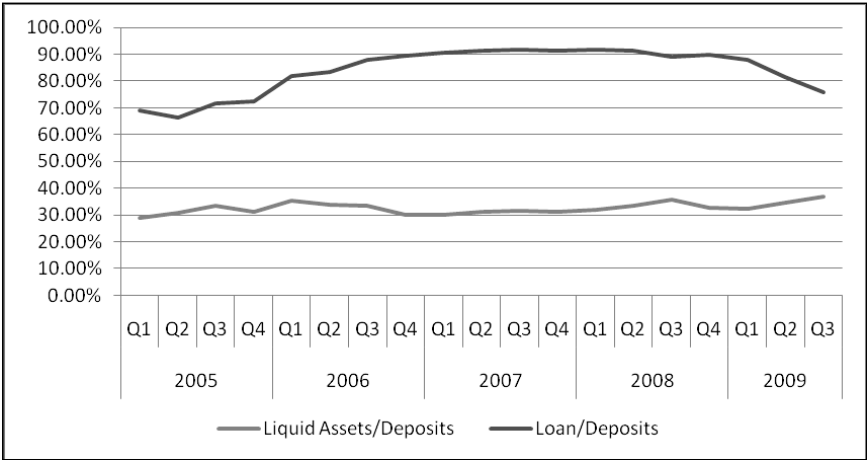
In addition to the commercial banking industry's non-performing loan (NPL) ratio, this study considered the NPL ratio by major sectors which have an impact on market liquidity, namely, the Financial and

Business Services (FBS) and Credit Cards (CC). During Q₄: 2006 to Q₁:2008, these two sectoral NPL ratios were below the commercial banks’ industry NPL ratio.

3.4 Funding Liquidity in Commercial Banks of Sri Lanka

Funding liquidity is a level of liquidity in a commercial bank whereby the bank is able to meet its current and future cash flow and collateral needs, both expected and unexpected, without materially affecting its daily operation or overall financial condition. There are several measures to assess the funding liquidity in the commercial banks. This study used the the loan-to-deposit ratio, the liquid asset-to-deposit ratio, and the sources and uses of funding in licensed commercial banks as the measures for the funding liquidity in commercial banks of Sri Lanka.

Figure 12
Loan-to-deposit Ratio and Liquid Asset-to-deposit Ratio

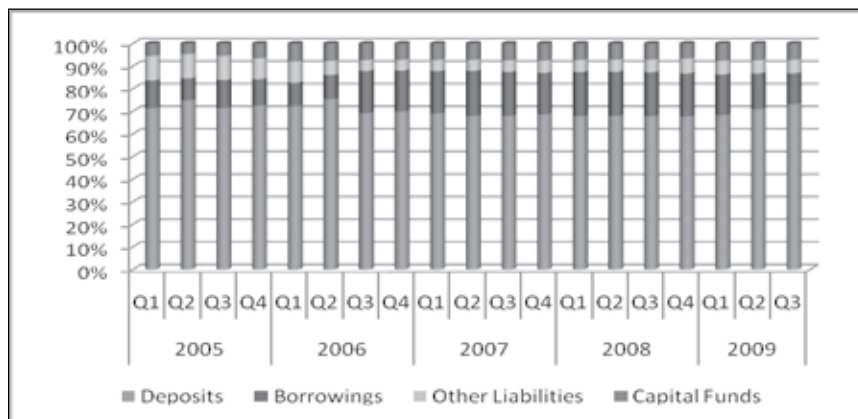


Source: Department of Bank Supervision, Central Bank of Sri Lanka

3.4.1 *Loan- to-deposit Ratio and Liquid Asset-to-deposit Ratio*

A loan-to-deposit ratio exceeding 90% implies that the commercial banks are vulnerable to funding liquidity. As shown in Figure 12, the commercial banking industry in Sri Lanka could manage its loan-to-deposit ratio below or at 90% during the period under consideration with lesser vulnerabilities for the funding liquidity. This was further strengthened by its higher liquid asset-to-deposit ratios (more than 30%).

Figure 13
Sources of Funds in Commercial Banks of Sri Lanka

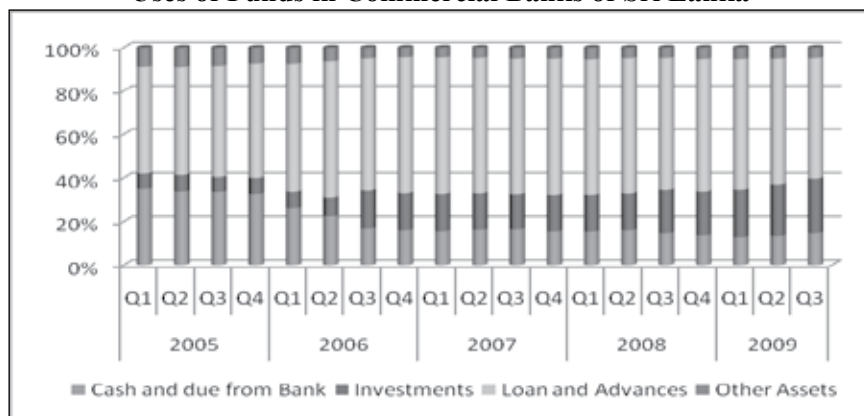


Source: Department of Bank Supervision, Central Bank of Sri Lanka

3.4.2 Sources and Uses of Funding in Commercial Banks

The major source of funding of commercial banks of Sri Lanka was deposits (nearly 70%). However, as shown in Figure 13, deposits have been shown a slight declined from Q₃, 2006 to Q₁, 2009, while borrowings have increased.

Figure 14
Uses of Funds in Commercial Banks of Sri Lanka



Source: Department of Bank Supervision, Central Bank of Sri Lanka

The loans and advances was the dominant application in the use of funds by commercial banks in Sri Lanka accounting for 50% to 60% of the funds mobilised over the period of the study. Cash and due from the banks was the second largest component until Q3:2006, when investments took over the second spot due to higher investment in government securities by the commercial banks. From the sources and uses of funds, it can be seen that the commercial banks in Sri Lanka are engaged in traditional banking business and are not attracting funds from the wholesale markets.

3.5 Market Liquidity vs. Funding Liquidity at Call Money Market

The interbank call money market is an overnight market and mainly serves commercial banks in meeting their immediate liquidity needs. Therefore, the orderly and stable functioning of the interbank call money market is important to minimise liquidity risk in the banking system as a whole. The call money market rate provides an indication of the funding liquidity management in the commercial banks. For example, if a commercial bank has a liquidity shortfall and if it does not have another option, it will borrow from the interbank call money market at high interest rates. High interest rate prevailing in the interbank call money market, therefore, reveals a weakness in the funding liquidity in the commercial banks. On the other hand, if market liquidity is in excess, it will reduce the interbank call money market rate and strengthen the funding liquidity in the commercial banks. Therefore, the interbank call money market is indicative of the market liquidity and funding liquidity.

3.6 Factors Affecting Liquidity Risk in Sri Lanka

3.6.1 Volatility in the Domestic Foreign Exchange Market

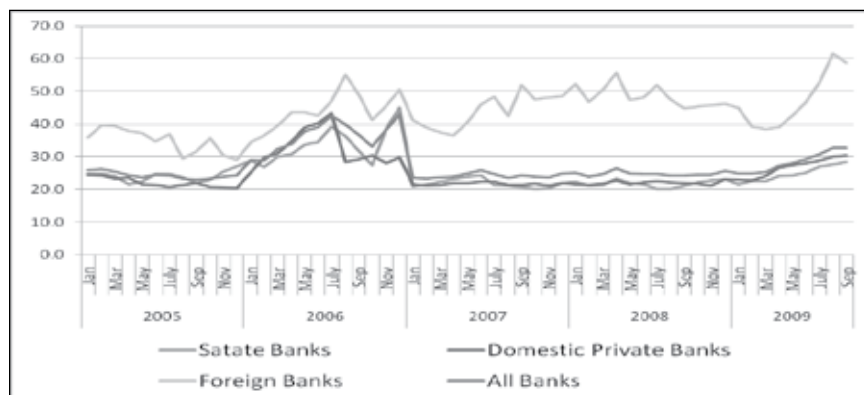
The CBSL intervenes in the domestic foreign exchange market mainly to prevent excessive volatility in the exchange rate and maintain a comfortable level of foreign exchange reserves in the country. The CBSL's buying and selling of foreign exchange would impact the market liquidity of domestic currency.

3.6.2 Public Confidence/Implicit Government Guarantee

As revealed from the recent crisis of a few authorised finance companies, public confidence is vital for financial institutions to secure deposits from the private sector in Sri Lanka. Due to the collapse of a

3.6.3 Bank Ownership Structure

Figure 15
Statutory Liquid Asset Ratio in Commercial Banks



3.6.4 Bank Balance Sheet Choice/Market Structure

4. Liquidity Risk Management in Commercial Banks in Sri Lanka

4.1 Past Development

In early 1985, the commercial banking system in Sri Lanka was highly oligopolistic in nature with the two state-owned banks holding above 70% of the total assets of the banking system. In addition to a lack of competition, the banking system was highly repressed in the seventies and eighties with interest rates being influenced through the state banks. However in the early nineties, policy makers and the government initiated an ambitious and far-reaching financial liberalisation programme and took several actions with the view of redefining the structure and operation of the banking system. As part of the economic reform programme, interest rate intervention on deposit was stopped. Moreover, the prudential norms and practices (core Basle principles) on effective banking supervision were introduced and they strengthened the liberalisation of the banking business activities, development of IT infrastructure and growth of the business of banks in Sri Lanka. In terms of exposure, the commercial banks were exposed to more risks. To strengthen liquidity risk management in commercial banks, the SLAR was introduced by the CBSL in April 1989. Accordingly, all the commercial banks operating in Sri Lanka were required to submit SLAR return to the CBSL from April 1989. The SLAR guided the measurement of the liquidity assets of the commercial banks.

4.1.1 Tools Used in Individual Commercial Bank Liquidity Management

The commercial banks are primarily funded through core deposits in Sri Lanka. These deposits are not insured but stable and relatively cheap. Rates paid on deposits did not fluctuate a great deal in relation to changes in general interest rates due to the limited investment opportunities and government intervention. The depositors are also restricted and allowed to withdraw money from their savings account not more than four times per month according to the CBSL directive.

The commercial banks in the past paid little attention to liquidity risk management. They applied primitive liquidity measurement tools, such as maturity ladder (based on contractual maturity of assets and liabilities), basic cash-flow projections, the Statutory Liquidity Assets Ratio and Loan-to-Deposits Ratio.

Liquidity management was a primary responsibility of the Head of Finance or the Chief Dealers of the commercial banks. Only a few large commercial banks had established Assets and Liability Management committees (ALCO). However, these committees typically lack proper representation by all the relevant line managers, Terms of References (TOR) and policies for liquidity risk management. On the other hand, most of the commercial banks did not have a liquidity risk management policy and contingency funding plans. The banks had totally ignored the off-balance sheet liabilities in the liquidity risk management process.

The liquidity risk management in commercial banks showed that the banks varied in their approaches in a liquidity crisis situation. The commercial banks had mostly focused on attracting additional sources of funds through costly borrowing and aggressive deposit mobilisation programmes or depositor retention strategies commensurating with the potential liquidity crisis situation. Accordingly, the commercial banks commonly used aggressive deposit mobilisation and retention strategies, such as special interest-rate offers (bonus interest or interest rate higher than the market), special gift items (raffle or deposit-volume-based), customer relationship management strategy (close relationship with the large depositors), and special benefit programmes, such as credit cards, special loan scheme, etc.

4.1.2 Liquidity Management in Domestic vs. Foreign Commercial Banks

There is no significant difference in the governance structure of liquidity risk management between domestic and foreign commercial banks in Sri Lanka. However, there were some differences in the use of liquidity measurement tools between domestic commercial banks and large foreign commercial banks (branches of Wall Street banks). A few foreign commercial banks had implemented model-based (based on their head offices) liquidity risk measurement tools. The foreign banks had been maintaining a significantly high liquid-asset ratio as compared to the domestic commercial banks.

4.2 Current Practices

With the emergence of banking competition, the limitation on low-cost deposits and rise of the requirement for third-party funding (albeit on a limited basis), commercial banks are now operating in a dynamic market in Sri Lanka, requiring the use of more sophisticated liquidity risk

management practices. Therefore, the liquidity risk management is part of the risk management framework of the commercial banks in Sri Lanka, which is accomplishing for the banks the same vigour as managing credit, market and operational risks. Some of the commercial banks in Sri Lanka have given greater attention to liquidity pricing and have considered frameworks to price liquidity. The CBSL has recently introduced web-based monthly returns on maturities on assets and liabilities of the commercial bank, which is a useful tool for measuring the liquidity risk of commercial banks. The CBSL will introduce an integrated risk management framework which also emphasises the liquidity risk management in commercial banks, with effect from 2010. However, the CBSL has not imposed any capital charge on the liquidity risk of the commercial banks in Sri Lanka.

4.2.1 Tools Used in Individual Commercial Bank Liquidity Management

The commercial banks consider liquidity risk management as one of the core functions of commercial banks. Therefore, they have paid more attention and have adopted new methodologies in liquidity risk measurements, management and governance structure, especially in the branches of well-known foreign commercial banks and in most of the large domestic commercial banks. However, some of the small domestic and foreign commercial banks still follow the past practices and are rudimentary in their liquidity risk management process.

In addition to the traditional primary tools, commercial banks now use advance liquidity measurement tools such as maturity analysis of assets and liabilities (behavioral approach), duration methods, advance duration-gap methods, Value-at-Risk model and other scenario-based approaches. The commercial banks take into account the off-balance sheet liabilities in liquidity measurement and management.

The board of directors, board level committees, and the Asset and Liability Committee (ALCO), which comprise the major business line leaders such as credit, finance, risk and treasury functions, are all involved in the liquidity risk management process in the commercial banks, like management of liquidity sources, setting gap limit, caps, etc. Compliance with the regulatory minimum liquidity and diversification of sources of funding can be considered as the commonly applied liquidity management tools in commercial banks of Sri Lanka. Disclosure of SLAR quarterly for the general public also can be considered as a measure of liquidity governance in Sri Lanka. It is observed that the few commercial

banks in Sri Lanka which have set up early warning indicators are not comprehensive in identifying the liquidity risk vulnerabilities.

4.3 Contingency Funding Plans and Stress Test

The CBSL has emphasised the importance of having a credible contingency planning and liquidity stress-test approach as a vital part of the liquidity risk management tool kit in the commercial banks in Sri Lanka. However, only few commercial banks have credible contingency plans and have paid greater attention to stress testing that is properly developed, well executed and fully involved by the senior management.

5. Lessons Learned from Recent Financial Crisis

Although the global economy and financial system entered a severe liquidity crisis in the beginning of 2007, Sri Lanka was affected by the exacerbating liquidity crunch in the global financial market in September 2008 following the collapse of Lehman Brothers. The initial effect of the liquidity crisis was an outflow of foreign currency from the country by way of withdrawals of foreign investments in government securities. The resultant pressure in the foreign exchange market warranted the CBSL's intervention in the foreign exchange market through the supply of foreign exchange to prevent a sharp depreciation of the exchange rate. The supply of foreign exchange by the CBSL dried up rupee liquidity in the money market, creating a liquidity shortfall during most of the fourth quarter of 2008. To address this shortfall in liquidity, CBSL injected Rs.24.5 billion through reductions in the SRR. The CBSL also injected liquidity through purchases of Treasury bills in the primary and secondary markets while the remaining shortfall was accommodated through reverse repurchase transactions. Though the initiatives were taken to offer liquidity through term reverse repurchase facilities, the demand was basically for overnight liquidity.

5.1 Liquidity Risk Management Practices after Crisis

There is no significant change in the liquidity risk management practices of the commercial banks of Sri Lanka after the crisis. Perhaps this could be a reason commercial banks in Sri Lanka are subjected to an effective liquidity ratio of 27% (20% of SLAR and 7% of SRR) of their deposit liabilities, which can be considered as an effective cushion against the commercial banks' liquidity risk.

However, the CBSL, as commercial bank regulator, has emphasised the need for strengthening the liquidity risk management framework of the commercial banks in Sri Lanka. It has paid special attention to developing credible contingency planning arrangements for the commercial banks. The CBSL has also paid greater attention to setting credible early warning indicators to identify liquidity risk vulnerabilities and carrying out effective stress-testing mechanism. The CBSL plans to issue guidelines for the compilation of maturity-gap analysis and introduce regulatory limits on negative mismatches in gaps in the asset and liability maturity profiles to strength the liquidity risk management of the commercial banks. In addition to the implementation of an integrated risk management framework for banks, the CBSL intends to formulate a framework for consolidated supervision, introduce a model to rate banks in identifying risks and providing early warning signals, and to continue the work of preparing the banking industry to adopt the new accounting standards on financial instruments (Based IAS 32 and 39) to strengthen the overall risk management framework of the banks.

5.2 Bank Crisis in Sri Lanka - Case Study

The CBSL strongly warned the general public through its notice of 21st January 2008 about the investment instruments offered by unauthorised institutions/parties and about the legitimate financial instruments and issuance. The notice disclosed the authorised financial institutions that come under the CBSL's regulation and supervision and are permitted to accept deposits. The notice further clarified the underlying risk people bear in investing their hard-earned money in unauthorised financial institutions/individuals. Subsequently, the CBSL disclosed the names of a few unauthorised financial institutions and personnel. As a result of the CBSL public notices, people started withdrawing their money from unauthorised financial institutions/personnel and a few such institutions began to collapse due to the liquidity crisis. This caused a deterioration of public confidence in some financial institutions in Sri Lanka, especially the smaller finance companies, resulting in an increase in deposit withdrawals.

One of the leading business groups in Sri Lanka owns a collapsed unauthorised financial institution, a few of the distressed finance companies, and a leading commercial bank. The collapse of the unauthorised financial institution and distress of the finance companies led to a deterioration of public confidence in this business group as well as in the commercial bank.

People started withdrawing deposits from this bank creating numerous problems for the bank. The CBSL responded to address the situation of this commercial bank with regard to deposit withdrawals and its ensuing liquidity problems. As the difficulties of this bank posed a threat to the stability of the financial system, the CBSL took immediate action to stabilise the situation and implemented the following measures.

- (a) It discontinued the services of all the current directors of the bank;
- (b) Appointed one state bank to carry on the business of the bank;
- (c) Requested the state bank to appoint a new Board of Directors; and
- (d) Continued with the services of the present CEO and all the current employees of the bank, without any interruption.

The CBSL notified the general public to carry on its transactions with the bank and assured the public of the safety of its deposits. The CBSL granted the bank loan facilities under normal and special circumstances (standing facility). Currently, the bank has regularised all its activities and repaid all the CBSL loans. Sri Lanka taught the world how it could overcome a domestic banking crisis by saving taxpayers' money.

6. Conclusion and Policy Recommendation

The financial institutions, especially the commercial banks that have been operating in higher gearing, are exposed to risk vulnerability. The failure of the banking system can increase macroeconomic instability, particularly when it contributes to fiscal deficits and drains foreign exchange reserves. Banking system crises necessitate government tax increase as more public revenue is needed for intervention and restructuring of the banking sector. Therefore, a sound banking system is mandatory for economic stability.

We learn from the recent global financial crisis, liquidity risk management has a direct influence on the soundness of the banking system of any economy whether developed or less developed. Therefore, it is necessary for an economy to make it a priority to establish a comprehensive liquidity risk management framework which can address market liquidity and funding liquidity. Market liquidity is referred to as economy-wide liquidity management, whereas funding liquidity is referred to as the bank-level liquidity management. This study showed

that market liquidity management and funding liquidity management are economically significant because both of them are inter-related. Any liquidity risk management should basically address the liquidity measurement, assessment and governance structure. Accordingly, this study discussed the liquidity risk management framework of Sri Lanka in terms of liquidity measurement, assessment and governance structure. In addition, this study focused on the factors that affect liquidity in Sri Lanka and the Sri Lankan response to the global financial crisis.

Sri Lanka does have a market liquidity measurement (forecast) methodology which measures the daily market liquidity based on several variables, but it is not a comprehensive model-based methodology. Due to uncertainty about the measurement of the market liquidity, the CBSL does not disclose its long- and short-term market liquidity estimates in advance. This has resulted in uncertainty among market participants, leading to significant volatility in market interest rates. However, the study used a few quantitative and qualitative indicators to assess market liquidity in Sri Lanka which show the stock market indices, loan-to-deposit ratio, and liquidity stock in commercial bank as some useful indicators to measure the market liquidity in Sri Lanka. It is also evident that the funding liquidity in Sri Lanka is mostly influenced by the market liquidity.

The study observed some of the factors that affect the liquidity risk in Sri Lanka. The FX market behaviour directly influences liquidity risk in the domestic currency market as a result of the CBSL's intervention in the market. The CBSL has to address this issue with a comprehensive FX forecast and management methodology. Non-availability of deposit insurance (a blanket guarantee) also influences the liquidity risk in Sri Lanka through public confidence and bank ownership structure. Sri Lanka therefore requires a comprehensive deposit insurance scheme (with plan in progress to establish such a scheme in 2010) and should properly address the moral hazard issues, too.

The direction of liquidity risk management in the commercial banking business in Sri Lanka has been changing over the years. The commercial banks are required to adopt the best practices on liquidity risk management. They are challenged to think critically and more positively about the contingency planning and stress testing. The CBSL, as a bank regulator, has taken several steps in improving the liquidity risk management in commercial banks in Sri Lanka.

The CBSL has imposed an effective 27% regulatory liquidity requirement on commercial banks in Sri Lanka through two regulatory ratios, SLAR (prudential regulation) and SRR (monetary policy measure). These liquidity requirements have provided a comfortable cushion for the commercial banks in Sri Lanka tiding them through the period of the recent global banking crisis. However, the higher regulatory liquidity may negatively influence the interest margin (spread) of the commercial banks because the CBSL does not pay interest on SRR and liquid assets generate a lower return on them. The CBSL, therefore, should consider a principal-based approach for administering the regulatory liquidity requirements.

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LIQUIDITY MEASUREMENT AND PRACTICES IN TAIWAN

by Michael M.K. Lin¹

1. Overview of Financial System and Commercial Bank Industry

Taiwan has a diverse financial system which comprises many types of financial markets and institutions. The principal financial markets in Taiwan include the banking and insurance markets, the money market, the capital market, and the foreign exchange market.

The principal financial institutions include domestic banks, local branches of foreign banks, credit cooperative associations (CCA), credit departments of farmers' associations (CDFA), credit departments of fishermen's associations (CDFI), Post Corporation, insurance companies, bills finance companies, securities firms, futures firms, and securities finance companies.

1.1 Share of Banking Sector vs. Capital Market

Financial services output as share of GDP was 10.64% in the second quarter of 2009. The banking sector accounted for 6.88% of the segment, insurance sector accounted for 2.69%, and securities and futures sector accounted for 1.06%.

As of end-June 2009, Taiwan had 38 domestic banks, 32 foreign banks, 27 credit cooperative associations, 264 credit departments of farmers' associations, 25 credit departments of fishermen's associations, 10 bills finance companies, 1 Postal Savings System, 52 insurance companies, 94 securities firms, 4 securities finance companies, and 25 futures firms.

In terms of assets, domestic banks accounted for 87.4% of the outstanding value of assets held by the banking sector. Local branches of foreign banks accounted for 7.3% as of end-June 2009 (Figure 1).

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Figure 1
Outstanding Amounts of Asset by Banking Sector

Unit: NTD billion

Institutions	2006		2007		2008		June 2009	
	Amount	%	Amount	%	Amount	%	Amount	%
Domestic banks	31,977	88.8	32,559	87.3	34,136	86.4	34,903	87.4
Local branches of foreign banks	2,316	6.3	2,656	7.1	3,275	8.3	2,916	7.3
CCA	641	1.8	581	1.6	581	1.5	582	1.5
CDFA	1,454	4.0	1,445	3.9	1,455	3.7	1,479	3.7
CDFI	3.9	0.1	39	0.1	41	0.1	42	0.1
Total	36,427	100	37,280	100	39,488	100	39,922	100

Note1: End- of-period figures.

Note 2: Domestic banks include post corp.

The capital market includes stock and bond markets. The instruments of the bond market include government bonds, corporate bonds, and bank debentures. In terms of market value, the stock market accounted for around 80% of capital market in 2006 and 2007. After the global financial crisis in 2007, the stock price has plunged. The total value accounted for 67% of the capital market as of end-2008. However, the stock market gradually rebounded from the beginning of 2009. The total value accounted for 73.7% of capital market as of end-June 2009 (Figure 2).

Figure 2
Outstanding Amounts of Capital Markets

Unit: NTD billion

	2006		2007		2008		June 2009	
	Amount	%	Amount	%	Amount	%	Amount	%
Stocks (A)	19,377	80.5	21,527	79.5	11,707	67.0	16,215	73.7
Bonds (B)	4,708	19.5	5,542	20.5	5,769	33.0	5,778	26.3
Government Bond	3,385	14.1	3,520	13.0	3,736	21.4	3,902	17.8
Corporate Bond	1,151	4.7	1,105	4.1	1,137	6.5	1,055	4.8
Bank Debenture	172	0.7	917	3.4	896	5.1	821	3.7
Total (C=A + B)	24,085	100.0	27,069	100.0	17,476	100.0	21,993	100.0

Note1: End-of- period figures.

Note 2: The figures of stocks are total market value.

Note 3: The figures of bonds are outstanding.

1.2 Characteristics of Banking Sector

As of end-June 2009, among 38 domestic banks, there were 1 export-import bank, 2 industrial banks, 1 agricultural bank, 1 real estate

bank, 1 medium business bank, and 32 commercial banks. However, real estate bank, medium business bank, and agricultural bank can still conduct most businesses of commercial banks, such as deposit taking and loan extending on retail market for general public.

1.3 Nature of Banks' Business

According to the Banking Act, in general, businesses which may be conducted by a bank are as follows:

- a. Acceptance of various kinds of deposits;
- b. Management of Trust Funds under mandate;
- c. Issuance of Bank Debentures;
- d. Extension of loans;
- e. Discounting of bills and notes;
- f. Investment in securities;
- g. Investment in productive enterprises;
- h. Handling of domestic and foreign remittances;
- i. Acceptance of commercial drafts;
- j. Guaranteeing domestic and foreign transactions;
- k. Acting as collecting and paying agent;
- l. Underwriting and trading in securities for its own account or for customers;
- m. Managing the issuance of bonds and debentures and providing advisory services with respect thereto;
- n. Acting as attestor for the issuance of stocks, bonds, and debentures;
- o. Conducting businesses related to investment and trusts regarding securities;
- p. Buying and selling of gold bars/coins and/or silver bars/coins and foreign currencies; and
- q. Conducting other relevant businesses as may be authorised by the Financial Supervisory Commission (FSC).

Pursuant to the Article 22 of the Banking Act, a bank shall not conduct any business other than as approved by the FSC.

As of end-June 2009, the major uses of funds of domestic banks were loans. It accounted for more than 60% of total uses of funds. The major sources of funds were deposits. It accounted for more than 77% of sources of funds. The major uses and sources of funds are shown in Figure 3.

Figure 3
Major Uses and Sources of Funds of Domestic Banks

Unit: %

Uses of funds	2008	June 2009	Sources of funds	2008	June 2009
Cash and due from banks	15.9	18.1	Due to banks	7.1	7.5
Securities purchased	13.8	14.5	Deposits	77.0	78.4
Securities purchased under R/S	0.2	0.2	Securities sold under R/P	1.5	1.2
Loans	63.0	60.2	Borrowing funds	2.9	2.4
Property and equipment	2.0	2.0	Equities	6.1	6.1
Other uses of funds	5.1	5.0	Other sources of funds	5.4	4.4
Total	100.0	100	Total	100.0	100

Note 1: End-of-period figures.

Note 2: This table excludes post corp.

Regarding the market share of deposits and loans, domestic banks are the major players. In relation to deposits, the market share of domestic banks was around 90% of total deposits (Figure 4). For loans, the market share of domestic banks was around 85% of total loans (Figure 5).

Figure 4
Deposits of Financial Institutions in Taiwan

Unit: NTD billion

Institutions	December 31, 2007		December 31, 2008		June 30, 2009	
	Balance	%	Balance	%	Balance	%
Domestic banks	25,288	89.0	27,211	89.4	28,139	89.2
Local branches of foreign banks	1,241	4.4	1,328	4.3	1,475	4.7
CCA	535	1.9	537	1.8	539	1.7
CDFA	1,321	4.6	1,329	4.4	1,352	4.3
CDFI	36	0.1	37	0.1	38	0.1
Total	28,421	100	30,442	100.0	31,543	100.0

Note 1: Domestic banks include Postal Savings System.

Note 2: Credit cooperatives associations (CCA), Credit departments of farmers' associations (CDFA),
Credit departments of fishermen's associations (CDFI)

Figure 5
Loans of Financial Institutions in Taiwan

Unit: NTD billion

Institutions	December 31, 2007		December 31, 2008		June 30, 2009	
	Balance	%	Balance	%	Balance	%
Domestic banks	17,925	85.7	18,604	85.4	18,155	85.8
Local branches of foreign banks	651	3.1	796	3.6	704	3.3
CCA	344	1.6	342	1.6	342	1.6
CDFA	703	3.4	717	3.3	704	3.3
CDFI	19	0.1	20	0.1	20	0.1
SFC	101	0.5	35	0.2	58	0.3
Insurance companies	1,172	5.6	1,265	5.8	1,174	5.6
Total	20,915	100	21,779	100.0	21,157	100.0

Note 1: Domestic banks include Postal Savings System.

Note 2: Securities finance companies (SFC)

1.4 Characteristics of Government Bond Market

Regarding government bonds, the primary dealers are chosen from the government bond dealers by the Central Bank of Republic of China (Taiwan). They are appointed to play the role of market makers which are obligated to provide liquidity and quotation of benchmarks. To date, there are 66 dealers, including 21 domestic banks, 3 local branches of foreign banks, 10 bill finance corporations, 4 local insurance companies, and 28 securities houses. For the primary dealers, there are 4 domestic banks, 1 local branch of foreign banks, 3 bill finance corporations, and 7 securities houses.

Only government bond dealers are allowed to submit bids at the government bond auctions. However, investors can participate in the auction by submitting their bids through any one of the government bond dealers by filling in application forms that are available from them. The bids will be submitted under the name of the government bond dealers.

The Central Bank of Republic of China (Taiwan) issues government bonds on behalf of the Ministry of Finance. Taiwan's government bonds are sold at auctions, using the single-rate method. Minimum bid is NTD50 million and the incremental amount is NTD10 million. All bids are placed in terms of percentage yield.

1.5 Regulations and Restrictions Regarding Bank' Business Activities

Pursuant to Article 4 of the Banking Act, the scope of business of each bank shall be determined individually by a competent central authority, namely, the Financial Supervisory Commission (FSC) in accordance with the classification of the bank and the permitted business specified in the Act. However, transactions relating to foreign exchange must be approved by the Central Bank.

2. The Role of Central Bank

2.1 As Liquidity Providers

Pursuant to the Central Bank of the Republic of China (Taiwan) Act, the CBC's primary objectives are as follows:

- a. To promote financial stability;
- b. To guide sound banking operations;
- c. To maintain the stability of the internal and external value of the currency; and
- d. To foster economic development within the scope of the above objectives.

Based on CBC's objectives on the maintenance of financial stability, the CBC has legal authority to provide the liquidity to the financial institutions in the event that financial institutions have a liquidity problem.

2.2 As Financial Regulators

There are many financial regulators including CBC, FSC, Council of Agriculture (COA) and the municipal or county (city) government, and Central Deposit Insurance Corporation (CDIC) in Taiwan. Pursuant to the CBC Act, the CBC is conferred supervisory authority in accordance with the powers and functions authorised in the Act. The CBC could also undertake the examination of the operations of all financial institutions in Taiwan.

Since July 2004, the FSC has been an integrated regulator responsible for the development, monitoring, regulation, and examination of financial markets and financial enterprises except agricultural financial institutions in Taiwan. After the establishment of the FSC, the CBC only

conducts target examination with focus on monetary policy, foreign exchange policy, credit policy, and payment and settlement issues. However, based on the legal objectives, the CBC still conducts off-site monitoring through information system to screen warning signals from various financial institutions.

Regarding agricultural financial institutions, the Council of Agriculture (COA) and the municipal or county (city) government are the competent authorities responsible for oversight of the agricultural financial institutions based on the Agricultural Finance Law.

In addition, the Central Deposit Insurance Corporation (CDIC) is empowered under the Deposit Insurance Act to undertake deposit insurance business, extend assistance to an insured institution whose business operations are unsound, and to take conservatorship or receivership over problematic institutions subject to related laws, etc.

There is a liaison committee comprising the CBC, FSC, CDIC, and COA. This committee provides a forum for the discussion of financial supervisory issues including liquidity problem among its members. Generally, the meeting of the committee is held on a quarterly basis.

2.3 Liquidity Providers

Pursuant to the CBC Act, the CBC may provide accommodations to banks. In the light of financial conditions, the CBC may purchase and sell in the open market the bonds issued or guaranteed by the government, financial bonds issued by banks and bills accepted or guaranteed by banks. For the purpose of regulating monetary conditions, the CBC may issue certificates of deposits, savings bonds and short-term bonds, and may purchase and sell them in the open market. By the above measures, the CBC may provide liquidity to individual institutions during normal time or crisis time.

2.4 Central Bank's Requirement Regarding Banks' Liquidity Measurement and Management

There are three major requirements regarding financial institutions' liquidity measurement and management prescribed by the CBC. Specifically, they are the required reserve ratio, liquid reserve ratio, and limits on maturity mismatch.

2.4.1 Required Reserve Ratio

According to the “*Regulations Governing the Audit and Adjustment of Deposit and Other Liability Reserves of Financial Institutions*” prescribed by the Central Bank, the types and required reserve ratios of deposits for which financial institutions, including domestic banks, local branches of foreign banks, credit cooperative associations, credit departments of farmers’ associations, and credit departments of fishermen’s associations, shall set aside reserves are as follows:

- a. Checking deposits (10.75%)
- b. Demand deposits (9.775%)
- c. Savings deposits, including passbook savings deposits (5.50%), and time savings deposits (4.00%)
- d. Time deposits (5.00% including time deposits, negotiable certificates of deposits, and time deposits of postal fixed savings)

The various liabilities other than NTD deposits for which financial institutions shall set aside reserves are as follows:

- a. Foreign currency deposits
- b. Interbank overdrafts
- c. Interbank call loans
- d. Bank debentures
- e. Interbank financing
- f. Interbranch transactions
- g. Borrowings for time payments or repurchase agreements (bills)
- h. Other liabilities specified by the CBC

The current required reserve ratio of foreign currency deposits is 0.125%. The required reserve ratios of the other liabilities are 0%.

Actual reserves set aside by financial institutions for items which require reserves, shall be limited to the following assets:

- a. Cash in vaults;
- b. Deposits in reserve accounts with the Department of Banking of the CBC or Trustee Institution; and

- c. Deposits that have been approved by the CBC for placement in “Interbank Funds Transfer Guarantee Special Accounts” with the Department of Banking of the CBC or to special accounts of similar properties with Trustee Institutions.

The calculation period used as the basis for calculating the amount of legally required reserves to be set aside by financial institutions shall be from the first day of each month through the month’s end. The maintenance period for the setting aside of actual reserves by financial institutions shall be from the fourth day of each month to the third day of the following month.

In the event that the actual daily average reserve balance for a financial institution during a given reserve maintenance period fails to meet the Legally Required Reserve Balance, the financial institution may apply to offset the shortfall by the excess reserve of prior period within the limit of 1% of required reserve for the prior period. For shortfalls in excess of one percent, or the balances which are not replenished, those financial institutions will be charged penalty interest at 1.5 times the Bank’s unsecured short-term accommodation interest rate without collateral, and in serious circumstances they will be disciplined pursuant to the provisions of the Banking Act.

2.4.2 Liquid Reserve Ratio

In order to manage the liquidity of banks, Article 25 of the CBC Act requires the CBC to prescribe for banks a minimum ratio of their liquid assets to various liabilities. The minimum liquid reserve ratio is 7% currently.

According to the “*Directions for Auditing Liquidity of Financial Institutions*” prescribed by the CBC, all items of NTD-denominated liabilities of financial institutions shall be subject to a minimum liquid reserve ratio requirement.

The items of NTD-denominated liabilities are as follows:

- a. Checking deposits (including checking deposits and certified checks);
- b. Demand deposits;

- c. Savings deposits (including passbook savings deposits, lump-deposit/ lump-payment savings deposits, installment-deposit/ lump-payment savings deposits, lump-deposit/installment-payment savings deposits, interest-withdrawal savings deposits, and bank employees' savings accounts, provided those portions already pledged are deducted);
- d. Time deposits (including time savings deposits and negotiable certificate of deposit, provided those portions already pledged are deducted);
- f. Government Treasury deposits (the net balance after deducting the re-deposits at the CBC's Treasury Department);
- g. Net dues to banks in call loan market;
- h. Bills/bonds sold under repurchase agreements; and
- i. Other liabilities as designated by the CBC.

Qualified liquid reserve assets for financial institutions shall be limited to the following new Taiwan dollar-denominated assets:

- a. Excess reserves;
- b. Net dues from banks in call loan market;
- c. Re-deposits at designated banks with term to maturity of no more than one year (either bank re-deposits with the CBC or grassroots financial institution (including CCA, CDFA, CDFI) re-deposits with banks mandated by the CBC);
- d. Certificates of deposit issued by the CBC;
- e. Government bonds;
- f. Treasury bills;
- g. NTD-denominated bonds issued in Taiwan by international financial organisations approved both by the CBC and the FSC; and NTD-denominated corporate bonds issued in Taiwan by foreign issuers in accordance with the "Regulations Governing the Offering and Issuance of Securities by Foreign Securities Issuers";
- h. Negotiable certificates of deposit (net balance of each bank's holdings after deducting negotiable certificates of deposit it has issued);
- i. Bank debentures (including subordinate bank debentures, the amount of which being limited to the net-debit position of its bank debentures issued by other banks after subtracting those issued by itself);

- j. Banker's acceptances (net balance of each bank's holdings after deducting drafts it has accepted) are limited to those purchased from money market;
- k. Trade acceptances are limited to those purchased from money market;
- l. Commercial papers (net balance of each bank's holdings after deducting face value of commercial papers it has guaranteed) are limited to those purchased from money market;
- m. Corporate bonds (net balance of each bank's holdings after deducting face value of corporate bonds it has guaranteed); and
- n. Other liquid assets as approved by the CBC.

The amounts of qualified liquid reserve assets listed in Items (d) through (n) shall be calculated according to the following rules:

- A. For assets classified as "financial assets held for trading" and "financial assets designated as at fair value through profit or loss" recorded under "financial assets at fair value through profit or loss", the amount shall be that after adding/deducting valuation adjustment.
- B. For assets classified as "available-for-sale financial assets", the amount shall be that after deducting accumulated impairment loss and adding/deducting valuation adjustment.
- C. For assets classified as "held-to-maturity financial assets" or "non-active market debt instruments", the following rules shall be applied:
 - i. For assets listed in Items (d) through (f), the amount is that after deducting accumulated impairment loss.
 - ii. For assets listed in Items (g) through (n) shall not serve as liquid reserve assets.

Financial institutions shall put up the liquid reserves on a monthly basis. According to the regulation, financial institutions shall compile the "Liquid Reserves Adjustment Report" on a monthly basis and submit it together with related detailed schedules before the 15th of the following month to CBC or appointed banks for examination.

2.4.3 Limits on Maturity Mismatch

In order to monitor the mismatch of major sources of funds and major uses of funds, banks are required to report “Term to Maturity Analysis of NTD Assets/Liabilities” to FSC on a monthly basis. The CBC downloads all the data from FSC for review. Banks shall also report to the CBC the historical experience and other parameters used in preparing the “Terms to Maturity Analysis of NTD Assets/Liabilities”. Where the negative funding gap from the flow-of-funds in the next one to thirty days exceeds the specific value set by the CBC, the bank shall immediately report to the CBC providing explanations and proposing measures for improvement. The CBC will forward the results of offsite monitoring to the FSC or the COA for administrative management.

According to the regulation, the negative funding gap over total NTD assets within one month is not allowed to exceed the specific values. The specific values are -5% of total NTD assets for commercial banks, -10% of total NTD assets for industrial banks, and -15% of total NTD assets for the export-import bank.

3. Dynamics and Determinants of Liquidity Risk

3.1 Liquidity Profile in Taiwan’s Financial System

Due to the global financial crisis, liquidity has been injected to stimulate the economic growth as the Central Bank lowered the rediscount rate and rates on accommodations 9 times from March 2008 to February 2009.

Considering the instability of both domestic and international financial markets and for the sake of maintaining public confidence and providing full protection to depositors, the government in Taiwan announced a temporary guarantee for all deposits their full amount. The temporary measure takes effect from October 7, 2008 until December 31, 2010.

After the adjustments, every domestic bank met the regulatory liquidity ratio requirement of 7% in June 2009. The average liquidity ratio was 28.31% for domestic banks as a whole, increasing by 5.61 percentage points, up from 22.70% at the end of 2008. Liquidity in the domestic banking sector has been increasing.

3.2 Development of Liquidity Risk Indicators

3.2.1 Funding Liquidity

Due to the government maintaining an accommodative monetary policy stance, most banks have excess regulatory reserve in June 2009. The excess regulatory reserve reached NTD4,046 billion as of end-June 2009. Deposit growth rate still kept rising. The deposit growth rate was 11.5% as of end-June 2009, 3.8 percentage points up from 7.7% as of end-2008. Primarily led by banks' conservative attitude toward lending, loan-to-deposit ratios have recorded a decreasing trend over the last two years. The loan- to-deposit ratio was 76.8% as of end-June 2009, 8.0 percentage points down from 84.8% as of end-2007. The funding liquidity indicators are shown in as Figure 6.

Figure 6
Funding Liquidity Indicators (at end of year)

Indicators	2006	2007	2008	June 2009
Excess regulatory reserve**	2,876	2,495	3,017	4,287
Ratio of excess liquidity to required reserves	227.8	193.7	224.3	304.4
Ratio of liquid asset in relation to short-term liabilities***	22.95	20.56	22.70	28.31
Loan- to-deposit ratio	83.8	84.8	81.7	76.8
Deposit growth (YoY)	4.4	3.0	7.7	11.5

Note 1: The figures in this figure only include domestic banks.

Note 2: The figures of excess regulatory reserve are in billions of NTD.

** Excess regulatory reserve is liquid asset minus regulatory reserve requirement

*** The short-term liabilities include deposits, net dues to banks in call loan market, Bills/bonds sold under repurchase agreements, etc.

3.2.2 Market Liquidity

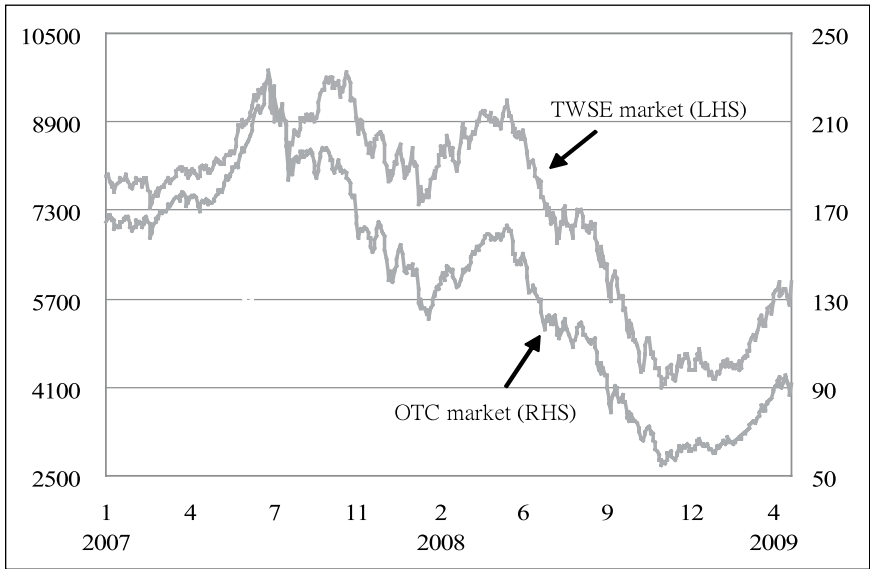
3.2.2.1 Stock Price Movement

Motivated by the developments of cross-strait economic and trade issues after the presidential election in March 2008, the Taiwan Stock Exchange Weighted Index (TAIEX) of the Taiwan Stock Exchange (TWSE) market trended upward and reached a high of 9,295 in mid-May 2008. Afterward, two gigantic US mortgage lenders (Fannie Mae and Freddie Mac), Lehman Brothers, and AIG faced difficult financial conditions, and the consequent blow to market confidence prompted major stock

markets around the world to slump, setting new record one-day percentage declines. Due to the global stock market crash and foreign investors' net selling, the TAIEX then fell back to 5,719 at the end of September 2008, down 38.47% compared to its highest closing level in 2008. The TAIEX index stopped falling and fluctuated in 2009. The main reasons behind this rebound were the net buying of foreign investors, inflows of residents' portfolio investments from abroad and the emerging effects of easing restrictions on cross-strait securities investment.

Meanwhile, Taiwan's GTSM Index (the over-the-counter or OTC index) basically tracked the movements of the TAIEX, falling sharply after hitting a peak of 163 in May 2008, and then declining to 83 at the end of September, a decrease of 49.08% from its highest closing level in 2008 (Figure 7). Following measures taken by the government to stimulate the economy, both TAIEX and GTSM Index rebounded from March 2009.

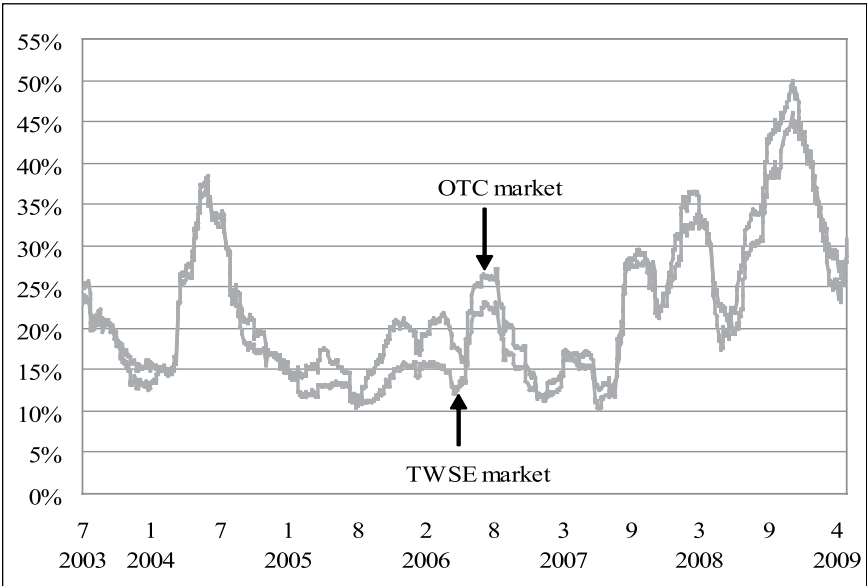
Figure 7
Taiwan Stock Market Indices



TAIEX volatility began to come down after hitting a peak of 33.67% in mid-March 2008, dropping below 20% in mid-June 2008, but it climbed again in July owing to the global stock market crash. With the volatility on the TWSE market and the OTC market in September 2008 reaching a record five-year high of 38.85% and 43.35% (Figure 8), respectively, the risks in stock investments have risen significantly. Market volatility subsided from its peak and stood at 30.74% and 30.52% for TWSE and

OTC markets, respectively, at the end of April 2009. Although market volatility moderated somewhat, the risk in equity investments remained.

Figure 8
Stock Price Volatility

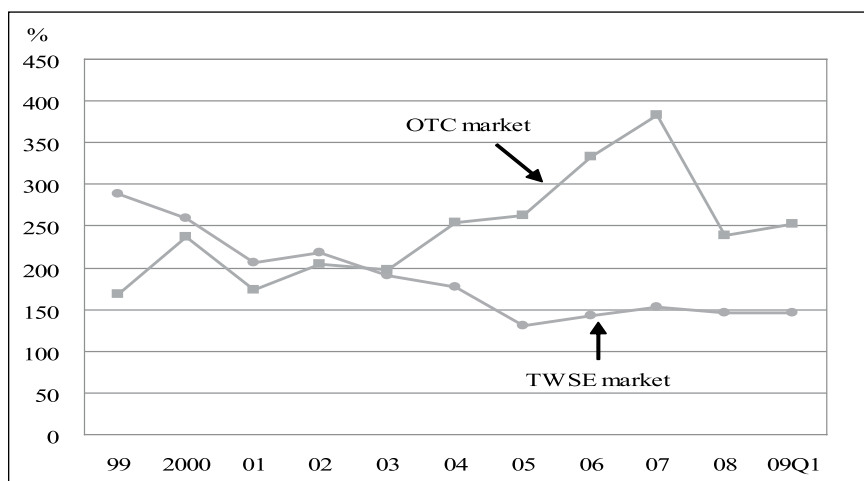


Note: Volatility refers to the annualised standard deviation of 60-day daily index returns.
Sources: TWSE, GTSM, and CBC.

3.2.2.2 Volume of Stock Transactions

As the global stock market turned bearish, the TWSE market cooled down during the first three quarters of 2008, with a dramatic decrease in trading value. However, as the result of market value tracking the movements of trading value, turnover ratio in terms of trading value on the TWSE still posted 152.25%, down slightly from 153.28% in 2007. After reaching a peak of 382.81% in 2007, the turnover ratio in the OTC market plummeted to 247.53%, with a dramatic decrease in trading value during the first three quarters of 2008 (Figure 9). In order to mitigate the impact of the extreme volatility in international stock markets from late September 2008, the FSC temporarily suspended all short selling and narrowed the daily percentage fall limit from the existing 7% to 3.5%. Consequently, the trading value of all - and OTC-listed stocks contracted markedly, leading to a lower turnover ratio and weakened market liquidity. Trading value started to increase slowly after the FSC resumed the 7% down-limit, effective from 27 October 2008. In early 2009, the trading value in the TWSE market continued to shrink.

Figure 9
Annual Turnover Ratio in Taiwan's Stock Markets



Note: 2008 Q1 are annualised results of the accumulated monthly turnover ratios.

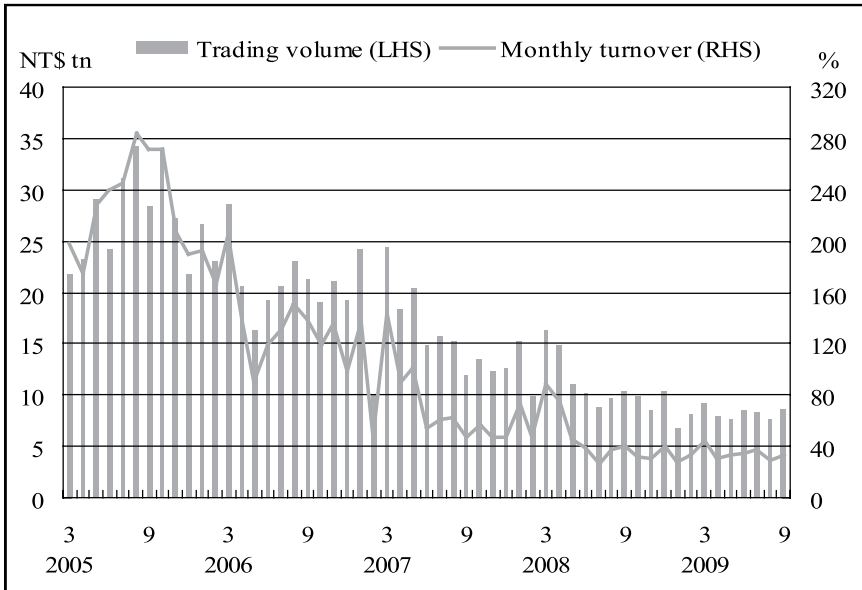
Sources: TWSE and GTSM

Nevertheless, it began to expand from March 2009. The monthly average turnover ratio of the TWSE market moved in an upward direction and maintained a level of 146.2% in Q1 of 2009. The monthly average turnover ratio of the OTC also increased modestly to 252.28% in Q1 of 2009.

3.2.2.3 Volume and Bid-ask Spread of Bond Transactions

In the bond market, both trading value and monthly turnover rate expanded in Q1 of 2008 due to sizable capital inflows. However, trading activities cooled from Q2 of 2008 onwards as financial institutions sought to reduce their spare funds through purchases of bonds, causing bond yields to decrease, which in turn discouraged bond trading. The monthly turnover rate fell noticeably to a trough of 25.75% in July, a five-year low. In August, both bond trading value and monthly turnover rate rebounded slightly as investors redirected funds from the lackluster equity markets into the bond market, but they still remained in low gear (Figure 10).

Figure 10
Bond Market Size and Turnover



- Notes:
1. Monthly turnover ratio = trading value in the month / average bonds issued outstanding.
 2. Average bonds issued outstanding = (bonds issued outstanding at the end of this month + bonds issued outstanding at the end of the previous month) / 2

Sources: CBC and FSC.

If we focus on government bond and state-enterprise bonds, the annual turnover ratios fell significantly from 29.0 in 2006 to 8.1 in 2008. The major factor is that most traders would like to keep bonds on hand due to a loose monetary policy in recent years. In Taiwan, The volume of government bond transactions concentrated on 10-year government bonds. The bid-ask spread of 10-year government bonds did not display too much fluctuation. In 2009, from Q1 to Q3 the turnover ratio of outright transactions and the trading volume of repo transactions in the bond market remained at a low level.

In 2008, due to the international financial crisis, the liquidity premium between 5-year twAAA² corporate bonds and 5-year government bonds reached 109.48 basis points. However, in 2009, the premium began to drop. The market liquidity indicators are presented in Figure 11.

2. The credit rating “tw” is applied in Taiwan.

Figure 11
Market Liquidity Indicators (at end of year)

Indicators	2006	2007	2008	June 2009
Bid-ask spread of 5-year government bonds	0.004018	0.005801	0.00542	0.011899
Bid-ask spread of 10-year government bonds	0.000846	0.000384	0.00073	0.002269
Liquidity premium	14.83 bp	17.94 bp	109.48 bp	73.88 bp
Turnover ratio of government bond	29.0	13.5	8.1	2.8
Turnover ratio of government, central bank, and state-enterprise bonds	24.0	12.5	7.5	2.6

Note 1: Average yearly bid-ask spread of government bonds $S = (PA - PB) / ((PA + PB) / 2)$

where S is spread, PA is the closing ask price, and PB is the closing bid price

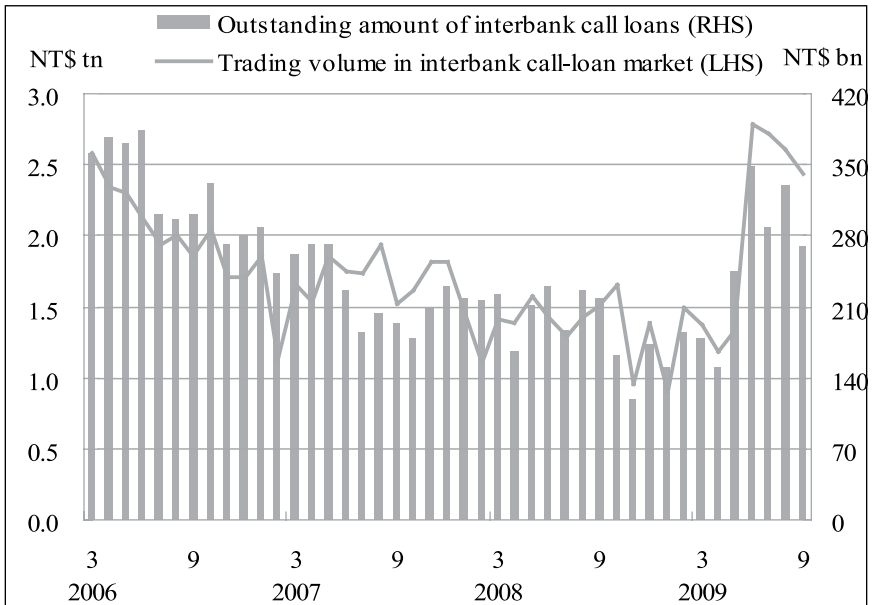
Note 2: Liquidity premium is year-end yield spread between 5-year twAAA corporate bonds and 5-year government bonds

Note 3: Turnover ratio is the volume traded during the year/outstanding volume at year-end

3.2.2.4 Volume of Interbank Market

The average monthly trading volume of interbank call loans was off 15.84% year- on-year from January through September of 2008, but both the trading volume and outstanding amount of interbank call loans trended upwards from August 2008 onwards (Figure 12), indicating that allocation of funding resources was somewhat uneven along with a rise in demand for interbank call loans. The average monthly trading volume of interbank call loans from January through September of 2008 consisted mainly of overnight call loans, accounting for 54.19% of average interbank call-loan transactions over the same period, a slight increase compared to the same period last year, followed by one-week call loans, with a declining share of 26.80%. Since October of 2008, the average monthly trading volume of interbank call loans has begun decreasing resulting in excess liquidity in banking sector. In May 2009, the trading volume rebounded sharply then began to drop.

Figure 12
Interbank Call-loan Market



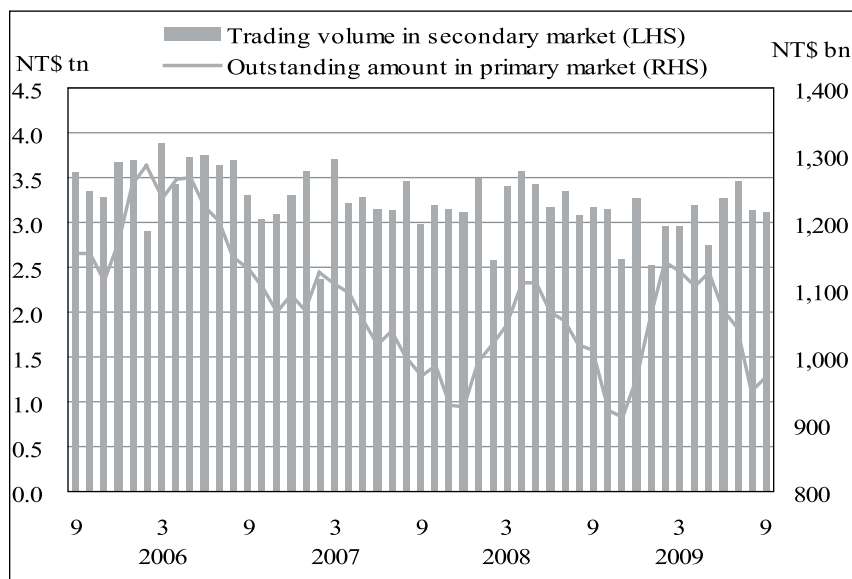
Note: Amount outstanding indicates average daily trading volume of the month

Source: CBC.

3.2.2.5 Volume of Bill Market

The transactions in the bill market include treasury bills, negotiable certificates of deposits, banker's acceptances, trade acceptances, and commercial papers. The outstanding amount of bill issuance increased in early 2008 but declined in June 2008. In September of 2008, the figure declined by 9.14% compared to the previous year-end, primarily because of a marked reduction in the outstanding issuance of treasury bills, while that of commercial paper rose by 6.40%. Affected by a rise in the issuance of commercial paper, the secondary market saw an expansion in trading volume in the first half of 2008. The average monthly trading volume rose by 9.27% year-on-year from January through September of 2008 (Figure 13). The primary market also saw an expansion in the outstanding issuance in the early of 2009 then dropped steeply in Q3 of 2009.

Figure 13
Primary and Secondary Bill Markets



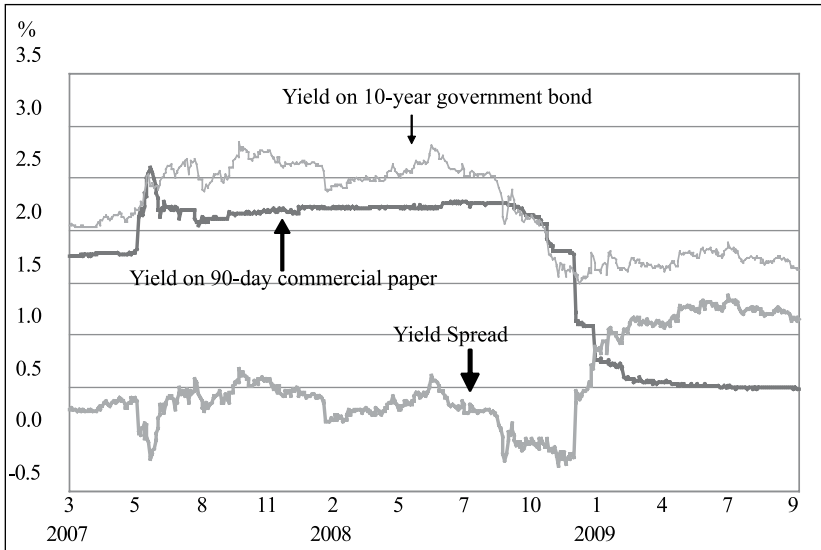
Note: Excluding ABCP.

Source: CBC.

3.2.2.6 The Short-term and Long-term Interest Rate

In 2008, the average overnight interbank call-loan rate increased steadily in response to rate hikes by the CBC, peaking at 2.166% in July, and then fell back to 2.092% in September as the CBC shrank the issuance of certificates of deposit to maintain market liquidity at an appropriate level against the backdrop of unfavorable financial conditions domestically and overseas. Interest rates on bills first rose and then fell, with the average rate on 1-30 day commercial paper in the secondary market falling to 2.01% in September after rising slightly to 2.03% in July 2008. As for long-term interest rates, the yield on 10-year government bonds began a gradual rise in Q2 of 2008, peaking at 2.82% in mid-June on the back of a rebound in equity prices, rate hikes by the CBC, and heightened inflation expectations. The bond yield dipped appreciably afterwards and registered 2.15% in September 2008. This was led by increasing inflows of funds into the bond market supported by the CBC's rate cuts and expanded Repo facility operations (Figure 14).

Figure 14
Yield Spreads



Note: Yield spread refers to yield on 10-year government bonds minus yield on 90-day commercial papers.

Source: Bloomberg.

The spread between the yields of 10-year government bonds and 90-day commercial papers began to widen in Q2 of 2008 as bond yields trended upwards. Bond yields dropped noticeably afterward, resulting in a convergence of yield spreads between 10-year government bonds and 90-day commercial papers. The yield spreads even became negative in mid-September and troughed at -20 basis points (Figure 14). Declining bond yields are unfavorable to financial institutions, which use short-term financing to fund long-term bond positions, despite the fact that they generate capital gains for financial institutions holding long bond positions. Due to a loose monetary policy, the yield on 90-day commercial papers went down enormously from the end of 2008. The spread between the yields of 10-year government bonds and 90-day commercial papers began to widen in 2009.

3.2.2.7 Factors Affecting Liquidity in Taiwan

There are many factors affecting liquidity of banks in Taiwan. These are loss of confidence, contagion effect, inadequate liquidity risk management, asset-liability mismatch, global financial crisis, growing

concentration in assets or liabilities, and trading losses. Sometimes, it is difficult to figure out which one is the most important factor. In general, while an individual institution suffers from huge loss, it will lose the confidence from customers and transaction counterparties. Then contagion effect will happen after depositors withdraw their money from the institution and the line of credit is suspended by its counterparties. Some institutions may find out that they could not deal with their liquidity problem resulting from the contagion effect.

3.2.2.8 Public Disclosure on Liquidity Risk

All banks in Taiwan must disclose their liquidity situation on their own websites every quarter including mismatch gaps, balance sheet and income statement, capital adequacy ratio, asset quality, earning, and market risk, etc. The CBC also discloses major financial ratios including mismatch gaps over net worth of domestic banks on website. If one bank has any incidental event, it is necessary to make announcement on the market observation post system. The disclosures would broaden the impact of liquidity risk. In order to alleviate stress from liquidity problem, banks are required to incorporate a standard operating procedure to handle the situation in their contingency plan.

3.2.2.9 Identification of Channels of Vulnerabilities

In Taiwan, there are two ways to identify the vulnerabilities of liquidity risk, specifically, on-site examination and off-site monitoring by regulators.

In on-site examination, the examiners perform an assessment of a bank's overall liquidity risk management framework and the adequacy of their liquidity. Based on a checklist, the risk tolerance of a bank and the effectiveness of a bank's process to measure and monitor liquidity risk are the major targets to assess.

In off-site monitoring, monitoring call reports received, such as required reserve ratio, liquid reserve ratio, and term to maturity analysis of assets and liability, from banks to regulators are the major methods to assess liquidity risk. Sometimes regular communication with a bank senior management and the board of directors are part of the regulators' channel.

3.2.2.10 Linkages between Funding and Market Liquidity Risks

The CBC conducts daily supervision on individual financial institutions through off-site monitoring which focuses on funding liquidity risk. Every quarter, the CBC produces a warning list to the monitoring team of problem institutions established under the CBC to assess the potential risk on funding liquidity. The CBC also organises an analysis team to watch market liquidity risk for macro-prudential purpose. Some of the financial soundness indicators regarding market liquidity are installed, including the turnover ratio of trading value in stock market and the monthly average turnover ratio in bond market. Every six months the CBC integrates funding liquidity data and market liquidity data and completes a detail financial stability report for internal reference. After numerous discussions with FSC, CDIC and some experts from universities, the CBC publishes a formal financial stability report for the general public every year.

4. Liquidity Risk Management in Banking

4.1 Past Developments

The CBC prescribes three major requirements for financial institutions with regard to liquidity measurement and management, namely, the required reserve ratio, liquid reserve ratio, and limits on maturity mismatch. All the deposit taking institutions (including banks, credit cooperation associations, credit departments of farmers' associations, and credit departments of fishermen's associations) are required to file monthly reports regarding the required reserve ratio and liquid reserve ratio to CBC. Banks are also required to file "Terms to Maturity Analysis of NTD Assets/Liabilities" to FSC. The CBC then retrieves the data from the FSC for monitoring purpose. If any financial institutions violate the requirements, the CBC will forward the deficiencies to FSC or COA for supervisory purpose.

4.2 Current Practices: An Application of Historical Experience

In order to monitor the mismatch of major sources of funds and major uses of funds, banks are required to report to the CBC the historical experience and other parameters used in preparing the "Terms to Maturity Analysis of NTD Assets/Liabilities" (Figure 15). The CBC requires that the negative funding gap over total NTD assets within one month should not

exceed the specific values. The specific values are –5% of total NTD assets for commercial banks, -10% of total NTD assets for industrial banks, and –15% of total NTD assets for the export-import bank. In practice, banks file different parameters based on their historical experience for approval. The items include demand deposits, undrawn commitments, credit card loan, etc. The following methods are adopted to calculate the parameters by banks.

Figure 15
Terms to Maturity Analysis of NTD Assets/Liabilities

Items	1-30 days	31-90 days	91-180 days	181 days-1 year	More than 1 year	Total
1. Inflow of funds						
Cash and due from banks						
Placement to banks						
Securities purchased						
Securities purchased Under R/S						
Loans						
Interests & revenues receivable						
Property and equipment						
Others items						
2. Outflow of funds						
Due to banks						
Demand deposits						
Time deposits						
Securities sold under R/P						
Borrowing funds						
Interests payable						
Undrawn commitments						
Equities						
Others items						
3. Funding gap						

A. Demand Deposits

1. Method A (fluctuation under a gentle trend)
2. Method B (fluctuation under a larger scale)

Method A (fluctuation under a gentle trend)

Step 1: Downloading Historical Data

At first, banks should download historical data at least 24 months. Banks may pick out the highest and lowest outstanding of demand deposits from each month. Then the average outstanding of demand deposits from each month will be calculated.

Step 2: Calculating the ratio of fluctuation

Banks should calculate the ratio of fluctuation from each month. The formula is as follows:

$$D_N = (A_N - B_N) \div C_N$$

AN: the highest outstanding of demand deposits in nth month.

BN: the lowest outstanding of demand deposits in nth month.

CN: the average outstanding of demand deposits in nth month.

DN: the ratio of fluctuation in nth month.

Step 3: Calculating the Average Ratio of Fluctuation

The formula is as follows:

$$R1 = (DN-1 + DN+2 + \dots + DN-24) / 24$$

(On the assumption that banks have 24 months' observation data)

R1: the average ratio of fluctuation within one month.

Step 4: Calculating Expected Outflow within One Month

The formula is as follows:

$$G_1 = F \times R_1$$

F: the outstanding of demand deposits on calculating date. G_1 : expected outflow within one month.

Step 5: Calculating Expected Outflow from Different Maturity Buckets

Option 1 (The simple approach)

31-90 days (G_2): $G_1 \times 2$

91-180 days (G_3): $G_1 \times 3$

181- 1 year (G_4): $G_1 \times 6$

More than 1 year (G_5): $F - (G_1 + G_2 + G_3 + G_4)$

A maturity distribution in different maturity buckets is tabulated as follows:

Items	1-30 days	31-90 days	91-180 days	181days-1 year	More than 1 year	Total
Demand deposits	G_1	G_2	G_3	G_4	G_5	F

Option 2 (The advanced approach)

Banks should calculate the average ratio of fluctuation within 3 months, 6 months, and 1 year based on the approaches used from Step 1 to Step 4. A maturity distribution in different maturity buckets is tabulated as follows:

	1-30 days	1-90 days	1-180 days	1days-1 year	More than 1 year	Total
Ratios	R1	Q1	H1	Y1		
	1-30 days	31-90 days	91-180 days	181days-1 year	More than 1 year	Total
Ratios	R1	Q2	H2	Y2		
Demand deposits	F1	F2	F3	F4	F5	F

R_1 : the average ratio of fluctuation within one month.

Q_1 : the average ratio of fluctuation within one quarter.

H_1 : the average ratio of fluctuation within a half year.

Y_1 : the average ratio of fluctuation within a year.

$Q_2=Q_1-R_1$ (the average ratio of fluctuation between 31-90 days)

$H_2=H_1-Q_1$ (the average ratio of fluctuation between 91-180 days)

$Y_2=Y_1-H_1$ (the average ratio of fluctuation between 181 days -1 year)

$F_1=F \times R_1$ (expected outflow within one month)

$F_2=F \times Q_2$ (expected outflow between 31-90 days)

$F_3=F \times H_2$ (expected outflow between 91-180 days)

$F_4=F \times Y_2$ (expected outflow between 181 days -1 year)

$F_5=F-F_1-F_2-F_3-F_4$ (expected outflow more than 1 year)

Method B (fluctuation under a larger scale)

Step 1: Downloading Historical Data

At first, banks should download historical data for at least 24 months. Secondly, banks may pick out the highest and lowest outstanding of demand deposits from each month. If the average ratio of fluctuation within one month is over 8.33%, banks may pick out the lowest figure (L) from the observation data.

Step 2: Calculating the Ratio of Fluctuation

Banks should calculate the average ratio of fluctuation within 1 month, 3 months, 6 months, and 1 year based on the approaches used on Method A from Step 2 to Step 3.

Step 3: Calculating Expected Outflow within One Month

The formula is as follows:

$$G_1 = F \times R_1$$

F: the outstanding of demand deposits on calculating date. G_1 : expected outflow from demand deposits within one month.

Step 4: Calculating Expected Outflow from Different Maturity Buckets

The lowest figure (L) from the observation data may be regarded as long-term deposit and be classified into more than 1 year interval.

31-90 days (G_2): $G_1 \times 2$

91-180 days (G_3): $G_1 \times 3$

181- 1 year (G_4): $F-L-(G_1+G_2+G_3)$

A maturity distribution in different maturity buckets is tabulated as follows:

Items	1-30 days	31-90 days	91-180 days	181days-1 year	More than 1 year	Total
Demand deposits	G_1	G_2	G_3	G_4	L	F

G_3 and G_4 may be zero if the fluctuation of deposits is bigger than 8.33%.

B. Undrawn Commitments

Step 1: Calculating Drawn Amounts of Commitments

At first, banks should download historical data at least 12 months. Secondly, banks may calculate drawn amounts of commitments from each month.

Step 2: Calculating the Ratios of Drawn Amounts

The formula of the ratio of drawn amounts is as follows:

$$R_n = A_n \div U_{n-1}$$

R_n : the ratio of drawn amounts in n_{th} month

A_n : the drawn amounts of commitments in n_{th} month

U_{n-1} : the outstanding of undrawn commitments at the end of $n-1$ month.

Step 3: Calculating the Average Ratio of Drawn Amounts

The formula is as follows:

$$R_A = (R_1 + R_2 + R_3 \dots + R_n) \div n$$

(On the assumption that banks have n months' observation data)

R_A : the average ratio of drawn amounts

Step 4: Calculating Expected Outflow of Undrawn Commitments from Different Maturity Buckets

$$C = R_A \times U$$

U: the outstanding of undrawn commitments on calculating date.

C: expected outflow from undrawn commitments within one month.

A maturity distribution in different maturity buckets is tabulated as follows:

Items	1-30 days	31-90 days	91-180 days	181 days-1 year	More than 1 year	Total
Undrawn commitments	C	$C \times 2$	$C \times 3$	$C \times 6$	$U - C \times 12$	U

C. Credit Cards

Step 1: Calculating Full Repayment of the Outstanding Balance from Each Month

At first, banks should download historical data at least 12 months.

Secondly, banks may calculate full repayment of the outstanding balance from each month.

Step 2: Calculating Partial Repayment of the Outstanding Balance from Each Month

Banks may calculate partial repayment of the outstanding balance from each month.

Step 3: Calculating the Average Ratio of Full Repayment and Partial Repayment of the Outstanding Balance from Each Month

Banks may calculate the average ratio of full repayment of the outstanding balance from each month (R_f). Then banks may calculate average ratio of partial repayment of the outstanding balance from each month (R_p).

Step 4: Calculating the Average NPL Ratio of Credit Card Loans from Each Month

Banks may calculate the average non-performing loans (NPL) ratio of credit card loans from each month (R_N).

Step 5: Calculating Expected Inflow of Credit Card Loans from Different Maturity Buckets

C: the outstanding of credit card loans on calculating date.

$L_1 = C \times (R_T + R_p)$ (the expected inflow of credit card loans within 1 month)
 $L_p = C \times R_p$ (expected inflow of partial repayment of the outstanding balance within 1 month)
 $L_2 = L_p \times 2$ (expected inflow of credit card loans from 31 days to 90 days)
 $L_3 = L_p \times 3$ (expected inflow of credit card loans from 91 days to 180 days)
 $L_4 = C - L_1 - L_2 - L_3 - R_N \times C$ (expected inflow of credit card loans from 181 days to 1 year)

A maturity distribution in different maturity buckets is tabulated as follows:

Items	1-30 days	31-90 days	91-180 days	181days-1 year	More than 1 year	Total
Credit cards	L_1	L_2	L_3	L_4	$C \times R_N$	C

5. Lessons Learned in Taiwan

Resulting from the global financial crisis in 2008, a few banks suffered losses from their foreign investments. After the disclosure of their financial status, these banks addressed their deposit drain in a systematic way.

In order to meet the requirements of the CBC, these banks set three phases to improve their liquidity as follows:

Phase I

- (1) Banks applied for short-term accommodation to the CBC with securities sold under repurchase agreements. The security was certificates of deposit issued by the CBC.
- (2) Banks applied for short-term accommodation by drawing promissory notes payable to the CBC. The promissory note should be secured by certificates of deposit issued by the CBC, government bonds, and treasury bills.
- (3) Banks suspended some large amount of loans.
- (4) Banks pushed a series of projects for deposits taking under preferential interest rates.

Phase II

Banks applied for short-term accommodation to the CBC. Banks should provide eligible bills or securities consented by the CBC as collaterals.

Phase III

Banks disposed liquid assets with a small impact on price.

Due to the Taiwanese government implementing a blanket protection for deposits on October 7, 2008, these problem banks only implemented Phase I to recover their liquidity status to stable within a short period of time. However, in order to improve the potential liquidity problem, these banks took some corrective measures. The followings are the major measures for banks to take:

- a. To reduce the percentage of deposits from investment trust funds and corporate firms and some wholesale counterparties.
- b. To raise the percentage of deposits from core deposits.
- c. To set a long-term (one-year) maturity mismatch limit in accordance with the risk tolerance
- d. To maintain strong relationships with fund providers.
- e. To conduct stress tests on an annual basis for a variety of short-term and market-wide stress scenarios.

Another issue is that some foreign banks received deposits and injected most of funds into their foreign affiliated units. As some of the international banks faced financial difficulty, the CBC and FSC found it necessary to establish a mechanism to protect depositors in Taiwan.

6. Conclusions and Future Direction

6.1 Conclusions

Liquidity risk is a common problem faced by banks. Policies which are soundly formulated for holding liquid assets or ready access to markets for borrowed funds are normally adequate to meet deposit withdrawals. However, large withdrawals can cause asset liquidity problems which can be compounded by incentives for liability claimholders to engage in runs at the first sign of a liquidity problem.

After the global financial crisis, a few Taiwanese banks faced net deposit drains. Although they did not face the need to liquidate their assets at low fire-sale prices, they came under tremendous pressure to meet their

financial claims. For financial stability and for the sake of maintaining public confidence, it was necessary for the government to provide full protection to depositors. However, this temporary measure must have a deadline to avoid moral hazard. The development of liquidity risk indicators is essential for regulators. In order to monitor liquidity risk, the government implemented some measurements such as required reserve ratio, liquid reserve ratio, and limits on maturity mismatch. Following numerous discussions with banks, the CBC developed a historical experience framework for the mismatch of major sources of funds and major uses of funds. A few Taiwanese banks also learned some lessons from experiencing liquidity problem and developed a more effective contingency plan.

6.2 Future Direction

The central bank's activities inevitably have an impact on market and funding liquidity. The FSC also has authority to impose regulatory measures for compliance by financial institutions. From the above analysis, the following suggestions are provided for policy consideration:

- a. Local branches of foreign banks be required to lend a minimum of 50% of their local deposits to local businesses, 40% of which would have to be in the form of NTD-denominated assets (a grace period of one year will be granted).
- b. To develop a more sophisticated methodology to estimate the expected outflow and inflow.
- c. To develop a more effective contingency plan based on some stress tests.
- d. To establish transparency of trading information to enhance market liquidity.
- e. To diversify major source of funds to meet banks' liquidity.
- f. To determine what kind of information should be submitted to supervisors?

LIQUIDITY MEASUREMENT AND MANAGEMENT IN THAILAND

by Sirinit Rattanapintha¹

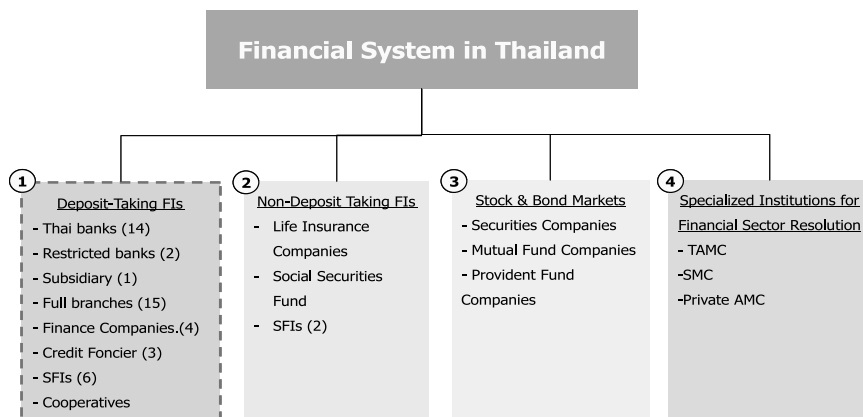
1. Overview of Thai Financial System

Thailand's financial sector is relatively large, with assets close to 222% of Gross Domestic Product at the end of June 2009. The Thai financial system is a crucial mechanism facilitating the overall functioning of the economy, in terms of allocating resources amongst the economic sectors, including national production market, labor market, service market, and money market, by playing a key role as an intermediary in distributing funds from surplus sources to deficit sources.

The Thai financial system is bank-based, although the role of capital markets and non-bank financial institutions is increasingly important. After the 1997 crisis, the Thai government expended great effort in developing other markets, apart from the banking system, including the Capital Market and fixed-income securities market, to reduce the dependency on the banking sector and enhance overall market efficiency by deepening the funding sources and investment alternatives for Thai investors. Consequently, this would help provide greater balance and sustainability for the economy as a whole. The financial system in Thailand has been gradually improving since the 1997 crisis. The key players in the system can be classified into the following four categories:

1. Author is Senior Examiner of the Supervision Group of Bank of Thailand.

Figure 1
The Thai Financial System



1.1 Deposit-taking Financial Institutions

Players in this category can take deposit from customers. There are several types of players in this group, including domestic banks, restricted banks, subsidiary, foreign bank branches, finance companies, and credit foncier companies. Domestic banks seem to outperform the market.

The deposit-taking financial institutions underwent a major restructuring over the past decade. This includes:

1. Closure and mergers of a number of finance companies;
2. Implementation of the Financial Sector Master Plan, resulting in new entrants, mergers, and the formation of new banking conglomerates; and
3. Ownership changes from private bank recapitalisation, government intervention in banks, and the sale of two banks to foreign investors.

Foreign-owned banks play an important but limited role in the Thai financial system. Foreign banks accounted for about 13% of the total banking assets as of end-June 2009. In accordance with the Bank of Thailand (BOT) rules, they are allowed to establish only a single branch in Thailand. Therefore, in light of this branch restriction, the size and the scope of their retail banking activities are assuming to be limited. The majority of the foreign-owned banks strongly emphasise on wholesale banking businesses, like treasury trading, FX trading, and trade finance.

In accordance with the Financial Master Plan and One Presence Policy, the BOT tried to encourage finance companies, and credit foncier companies to upgrade themselves to have a license of a commercial bank or restricted bank.

For over a past decade, the deposit-taking financial institutions went through a major restructuring, which includes the closures, mergers and acquisition among finance companies, together with the implementation of the government's Financial Sector Master Plan (FSMP). This Master Plan is aimed at reforming the landscape of the Thai financial sector with the aim of creating stability and efficiency in the banking system. The FSMP brought about new entrants, mergers, and the formation of new banking conglomerates.

1.2 Non-deposit-taking Financial Institutions

This type of institution consists of leasing, asset management, insurance, and securities companies. Insurance companies are supervised by the Department of Insurance under the Ministry of Commerce. The majority of them are subsidiaries of local banking conglomerates.

1.3 Stock and Bond Markets

The Thai bond market is sizable and is dominated by public debt instruments. The issuance of corporate debt instruments remains limited. For the primary market, the new domestic bonds and bills of exchange issued in 2009 reached a total of US\$330 billion, a decrease of 3.19% over the previous year. While the outstanding registered bonds in the ThaiBMA (Thai Bond Market Association) totalled US\$178 billion as of 30 December 2009, government bonds take up the biggest portion with an amount of US\$65 billion, or an increase of 17.83% over the previous year, followed by the BOT bonds of US\$55 billion, with an increase of 24.17% over the previous year. Corporate bonds recorded a total of US\$32 billion. For the secondary market, the trading volume is approximately US\$441 billion.

1.4 Specialised Institutions for Financial Sector Resolution

Institutions in this category were created by special purpose as to manage and resolve the non-performing loans.

2. Banking Sector in Thailand

Banks are the prominent players in the financial system in Thailand. There are many types of banks operating in Thailand nowadays. The Thai registered banks can be classified into 14 full licensed banks, 2 restricted banks, and 1 subsidiary. In addition to the local banks, there are 14 foreign bank branches operating in Thailand at present. Restricted bank was established pursuant to the Financial Master Plan, to serve and operate in the retail and SME banking niche only. This type of bank is not permitted to perform FX trading and derivative activities as it might not match with its initial objective. This type of license was created with the purpose to serve the needs of small-sized firms and retail businesses.

Clearly, the Thai banking system is currently dominated by the domestic banks with total assets making up approximately 87% of the assets of the banking system, while the foreign-owned bank accounted for merely 13%. The foreign-owned banks, by law, are only allowed to operate a single branch in the country.

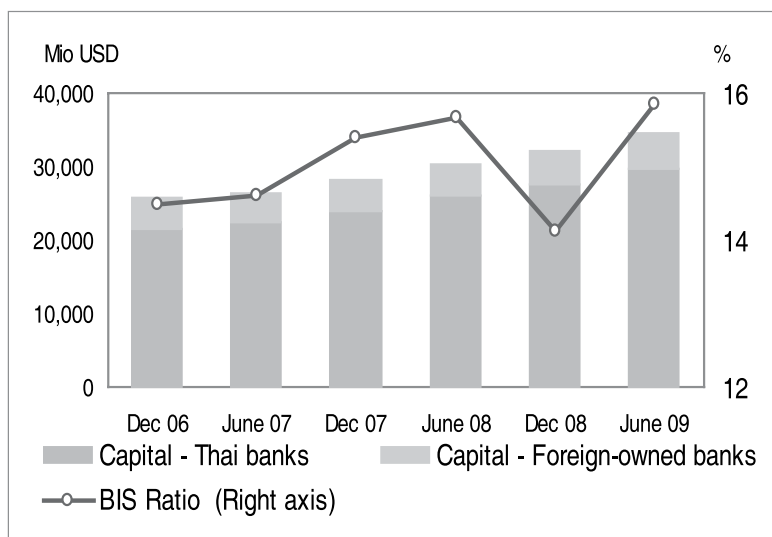
Figure 2
The Thai Banking Sector

Unit: Thousand USD

As of June 2009	Thai Registered Bank	Foreign Bank Branch	Total
Total Asset	260	38	298
Net Loan (excluding Interbank)	171	15	186
Net Investment	35	9	44
Deposit (excluding Interbank)	193	14	206

The fundamentals of the Thai banking system continue to strengthen, with most banks reporting high capital levels and solid operating profitability. Thai Banks' return on assets (ROA) fell to 0.88% in mid-2009 compared to 1.17% for June 2008. The ROA of the foreign bank branches declined as well from 1.45% as of June 2008 to 0.68% in June 2009.

Figure 3
Capitalisation of Banks in Thailand



As of June 2009, the banking sector continued to strengthen, with most banks reporting high capital levels and solid operating profitability. The capital position of the Thai commercial banking system remained strong, as reflected by the capital adequacy ratio (CAR) of approximately 15.83% as of June 2009, well above the regulatory minimum requirement of 8.5%.

Additionally, the ratio of regulatory Tier-1 capital to total assets at the end of June 2009 stood at 11.59%, well above the minimum requirement of 4.25%.

2.1 Credit Quality

Credit quality in Thailand has improved, compared to the previous year, due largely to the recovery of the Thai economy, together with tightened lending standards at financial institutions and continued acceleration in debt restructuring. The NPL ratios of both the corporate and household sectors had levelled off. The delinquency ratio of the corporate sector showed signs of stabilisation while that of the household sector came down slightly after increasing in the previous year. The overall NPL ratio of the banking system has declined to 5.40% as of end-June 2009, compared to 6.45% the same period last year.

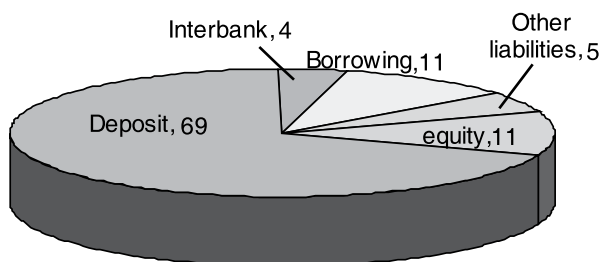
2.2 Profitability

Following the crisis in 1997, the banks sought to diversify their income base so as not to rely unduly on interest income, and looked toward generating fee-based income, simultaneously expanding their scope of service to retail markets and small- and medium-sized enterprises (SMEs). The diversification of bank lending portfolio and revenue base would help improve the concentration risk and earning volatility.

2.3 Major Uses and Sources of Funds of Thai Banking Sector

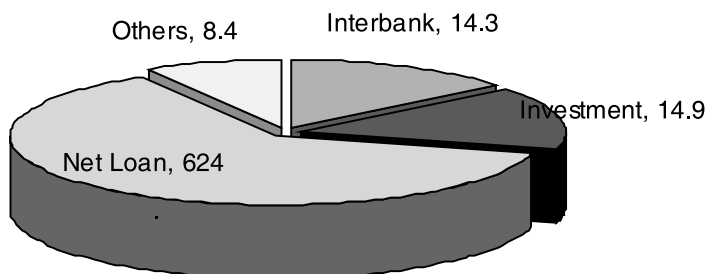
The banks operating in Thailand are deposit-based. Deposits is the major funding source and accounts for nearly 70% of the funds, followed by equity and borrowing. Nowadays, banks are increasingly issuing bills of exchange to capture the excess money in the market since the government announced the removal of its full blanket guarantee in the near future.

Figure 4
Sources of Funds of Thai Banking Sector



With regard to the uses of fund, the bulk of the bank assets which stems from lending activities accounts for approximately 62.4% of banks' total assets, followed by investment and interbank exposure. The key sectors of bank lending are personal loans and manufacturing sector loans accounting for 22% each.

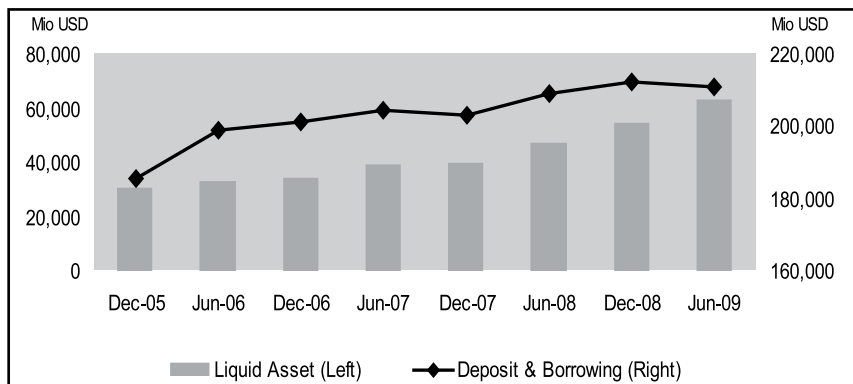
Figure 5
Uses of Funds of Thai Banking Sector



2.4 Liquidity Condition in Thai Bank Market

In 2009, acting out of concern and responding to the challenge of the global financial crisis, many banks in Thailand tried to maintain a liquidity cushion as a buffer for a stress condition. The liquidity situation in Thailand gradually continues to improve, with the banking system building up on liquid assets. At this time of economic slowdown, with cash flow becoming more essential than ever, strengthening liquidity and cash management capability are the key concerns of bank management. Accordingly, banks in Thailand piled up their own liquidity and deployed the strategy “Cash is King”, including an investment in liquid debt instruments that would help them better manage their own liquidity position and simultaneously enhance yield. These instruments included Government bonds, the Bank of Thailand, and State-owned Enterprise bonds. The banks’ deposit base remains strong.

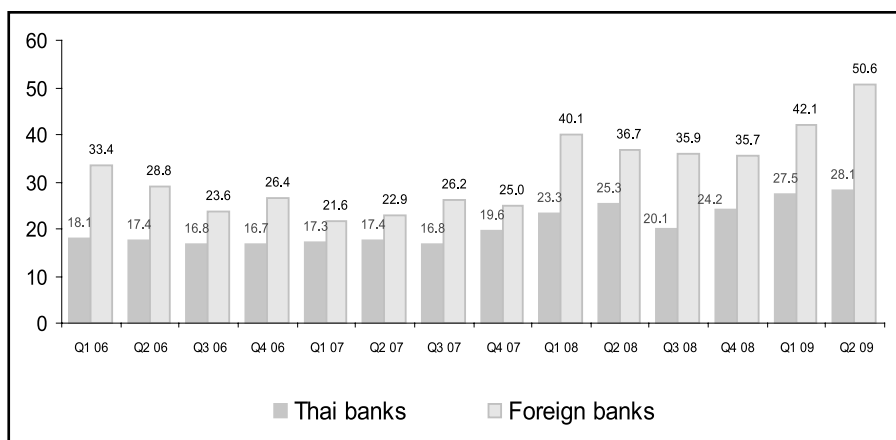
Figure 6
Trend of Liquid Asset and Deposit & Borrowing (2005 -2009)



Furthermore, the liquidity ratio gradually went up to 28.1% and 50.6% for Thai banks and foreign-owned banks, respectively. These current figures far exceeded the minimum legal requirement of 6%. This is another indicator that reflected the strong position of liquidity in the Thai banking system.

Thai banks had learned many lessons from the past crisis in 1997. Therefore, they tried to prevent the problem and paid attention to their asset and liability mismatch, together with holding ample liquidity to cover any unexpected shortfall in the future.

Figure 7
Trend of Liquidity Ratio of Thai Commercial Bank
and Foreign-owned Bank



For the liquidity management in the normal business time, banks typically establish an organisational function or unit which is responsible for the management, measurement and monitoring of liquidity position, liquidity forecast and liquidity risk for the bank as a whole and for its key subsidiaries. The Treasury Unit is normally responsible for liquidity management and asset-liability mismatch, while the Risk Management Department is in charge of monitoring and controlling the bank's liquidity risk. The practice in Thai banks is to establish an Asset Liability Committee (ALCO) to manage the overall bank liquidity. The committee consists of the heads of the relevant departments, including Treasury Department, Risk Management, Deposit, Credit lending, and Finance. The ALCO usually meets once a month to monitor the bank cash flow movement and assess the cash flow projection, reviewing and adjusting the bank's deposit strategy according to its current cash flow condition and market competition.

For liquidity management in times of crisis, the banks set up an early warning system with indicators that will trigger off in an abnormal situation sending out a warning sign of a potential liquidity problem. If some of the early-warning indicators are triggered, a unit in charge, like Risk Management Unit will analyse the circumstance, report the analysis and figures and explain to the ALCO immediately. Normally, the banks will establish a separate committee to handle the abnormal situation and to structure a proper action plan, contingency funding plan, resolution plan, or communication strategy with the public and regulators in an attempt to resolve the problem as soon as possible.

In conclusion, the liquidity in the banking system remains high. In quantity terms, this is reflected in a large surplus of liquid assets and a lower loan-to-deposit ratio.

3. Role of Central Bank in Banks' Liquidity Management

3.1 Role and Responsibility of Bank of Thailand

According to the Bank of Thailand Act B.E.2485, as amended by B.E.2008, the roles and responsibilities of the Bank of Thailand can be summarised as follows:

1. Prints and issues banknotes and other security documents. The BOT is empowered under the Currency Act and has sole rights to print and issue banknotes in the Kingdom.
2. Promotes monetary stability and formulates monetary policies. The BOT implements monetary policy as specified by (under the authority of) the Monetary Policy Committee performing the following: mobilising deposits, determining the interest rate for loans to financial institutions, trading foreign exchange and exchanging for future cash flow, borrowing foreign exchange in order to maintain monetary stability, borrowing money in order to implement the monetary policy, trading securities when necessary and exchanging for future cash flow in order to control the money supply in the country's financial system, and borrowing or lending the securities with or without returns.
3. Manages the BOT's assets

The BOT manages its assets (excluding the assets within the currency reserve according to the Currency Act) and invests such assets for returns by realizing the security, liquidity, return on asset, and management risks.

4. Provides banking facilities to the government and act as the registrar for government bonds.

The BOT provides banking facilities to the government in terms of depository and lending facilities for the Ministry of Finance, acts as the custodian for the government, acts as the representative of the government for investment in assets and FX, trades and

transfers bills of exchange, securities, and share certificates, and controls and oversees FX. In addition, the BOT may provide banking facilities to state enterprises or other government agencies. Moreover, the BOT acts as the registrar for government bonds by acting as the government representative in purchasing and selling government bonds, paying principal and interest, and acts as the registrar of state enterprises, specialised financial institutions, or other government agencies.

5. Provides banking facilities to the financial institutions.

The BOT provide banking facilities to the financial institutions by acting as lender of last resort for the financial institutions, and acts as the custodian for the financial institutions, requiring the financial institutions, whenever necessary, to report or explain about their assets, liabilities or contingent liabilities.

6. Establishes or supports the establishment of payment systems.

The BOT establishes or supports the establishment of payment systems, electronic clearing systems, and administers such systems for safety and efficiency.

7. Supervises and examines the financial institutions.

The BOT supervises, examines, and analyses the financial status, performance, and risk management system of the financial institutions in order to promote the stability of the financial institutions.

8. Manages the country's foreign exchange rates under the foreign exchange system and manage assets in the currency reserve in accordance with the Currency Act.

9. Controls the foreign exchange in accordance with the Exchange Control Act.

3.2 Monetary Policy and Instruments

Under the inflation targeting framework, the BOT implements its monetary policy by influencing short-term money market rates via the selected key policy rate, currently setting the 1-day repurchase rate.

The Monetary Policy Committee (MPC) signals shifts in monetary policy stance through announced changes in the key policy rate. The BOT uses a variety of monetary policy instruments to implement MPC's interest rate decisions.

The operational framework of the BOT's monetary operations consists of a set of instruments which can be classified into three categories, namely, Reserve Requirements (RR), Open Market Operation (OMO), and Standing Facilities (SF).

3.2.1 Reserve Requirements

Commercial banks are required to maintain the required reserves on average over a fortnightly period (starting on a Wednesday and ending on a second Tuesday thereafter) with carry-over provisions using the previous period's average level of commercial banks' deposits/liabilities as the base.

The amount of reserves required to be held by each bank is determined as a percentage of its reserve base. The reserve base comprises deposits, short-term foreign borrowings maturing within one year and other borrowings with index-linked returns or embedded financial derivatives. Currently, the reserve requirement ratio is 6% and the reserveable assets consist of:

- 1) A minimum 1% in non-remunerated current account deposits at the BOT, (of which not more than 0.2% in cash at the central cash centers of commercial banks can be counted towards this component);
- 2) A maximum 2.5% in vault cash; and
- 3) The rest in eligible public securities.

The averaging provision means that compliance with the reserve requirements is determined on the basis of the average of the end-of-day balances of the banks' reserveable assets over a maintenance period. Such averaging arrangement helps to facilitate the banks' own liquidity management and reduce daily volatility in short-term interest rates.

3.2.2 Open Market Operation (OMO)

In conducting open market operations, the BOT undertakes transactions in financial markets in order to affect the aggregate level of reserve balances (financial institutions' deposits at the BOT) available in the banking system, and therefore affect the short-term market interest rates.

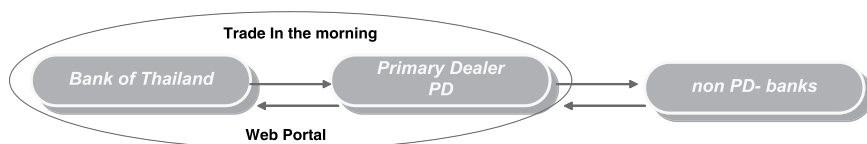
OMOs are the most actively used instrument to maintain the policy rate, while at the same time ensuring that there is sufficient liquidity in the banking system to meet banks' demand for reserves and settlement balances.

The BOT employs five main types of open market operations:

3.2.2.1 Bilateral Repurchase Operation (Bilateral RP)

The BOT uses bilateral repurchase and reverse repurchase transactions to temporarily add or drain reserves available to the banking system. The bilateral repurchase operation is conducted through "Primary Dealers (PDs)" appointed for bilateral RP transactions. Normally, the BOT conducts bilateral RP operations in the morning, by notifying the bilateral PDs before 9.30am, via Web Portal (a secured internet-based communication channel), of the bilateral RP operation the BOT plans to conduct that day (inject or absorb at which maturity).

Figure 8
Bilateral Repurchase Operation



The BOT has the option of conducting either fixed-rate or variable-rate tenders. To enhance the signaling effect of the policy rate, a fixed-rate tender is conducted for the 1-day tenor while a variable-rate tender applies for all other tenors. In other words, when the BOT wishes to conduct a 1-day bilateral repurchase transaction, it will do so at the policy rate. Thus, the PDs will indicate the amounts of money they wish to transact with the BOT at the policy rate. In a variable rate tender, PDs will indicate the amounts and the interest rates at which they want to transact with the BOT.

The BOT has gradually been increasing the importance of bilateral repurchase operation in its market operations, as this also fosters the development of the Thai money market. In doing so, the BOT has increased both the frequency and the amount of its bilateral repurchase operations. Currently, the BOT undertakes bilateral repurchase operations daily.

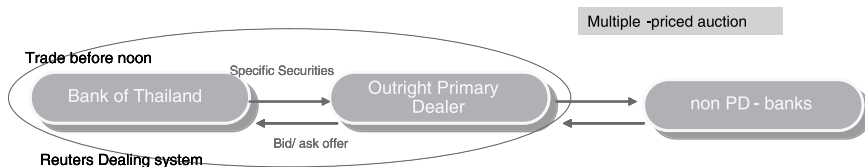
3.2.2.2 Outright Purchase/Sale of Government Securities

To permanently add or drain liquidity available to the banking system, the BOT buys or sells government securities outright with Outright Primary Dealers. The BOT usually adds rather than drains reserves through this channel to accommodate the permanent increase in currency in circulation as the economy grows. The scope for outright securities transactions by the BOT has greatly improved as the Thai bond market becomes more developed.

The procedure for outright operation involves the BOT notifying the Outright PDs before 10am, via Reuters Dealing system, the specific securities that the BOT would like to buy or sell. The PDs have half an hour to respond with their bids/offers indicating yields and amounts. The multiple-priced auction procedure is employed. The BOT will inform each PD before noon whether or not they have been allocated. Settlement takes place two days afterwards.

Although eligible securities include all types of secured public debt securities, the BOT has primarily used government bonds in outright operations as the market for government bonds is most liquid.

Figure 9
Outright Purchase/Sale of Government Securities



3.2.2.3 Issuance of Bank of Thailand Bills/Bonds

The BOT started reissuing Bank of Thailand Bills/Bonds in early 2003, with an aim of expanding the range of instruments used in the implementation of monetary policy. This would enhance the flexibility

and efficiency in managing money market liquidity and in conducting monetary operations.

The BOT determines the total issue size and maturity distribution in accordance with the prevailing money market conditions, taking into account the issuance schedule of public sector debts. The monthly auction calendar is announced in advance on the Bank of Thailand website.

Bills/Bonds are issued through competitive multiple-priced auctions held mostly on Tuesdays. Settlement takes place two days later on Thursdays. Eligible bidders comprise the same institutions as those eligible for the bidding of Treasury bills and Government bonds which are commercial banks, specialised financial institutions, finance companies, finance and securities companies, securities companies, Government Pension Fund, provident funds, mutual funds, Social Security Office, life and non-life insurance companies, and other institutions which hold their current accounts at the Bank of Thailand.

3.2.2.4 Foreign Exchange Swap

The foreign exchange swap is another instrument the Bank of Thailand uses to influence liquidity conditions in the money market. It supplements other market operations in domestic debt securities quite well especially when domestic debt securities are scarce. The FX swap is similar to a repurchase agreement in domestic debt securities, the difference being that the Thai baht is exchanged for foreign currency, namely the US dollar, rather than domestic debt securities.

The BOT facilitates the electronic platform for the bidding of buy-sell FX swap. Local banks wishing to obtain baht liquidity may do so by submitting their bids, via Web Portal, to the BOT before 1.30pm, indicating swap points, amount and maturity. The BOT, after taking into account the overall money market condition, will notify counterparties their results. Settlement usually takes place one or two days afterwards. The BOT will occasionally allow same-day settlement in exceptional circumstances.

Figure 10
Foreign Exchange Swap



The BOT also conducts liquidity withdrawal operations via sell-buy FX swap transactions with both onshore and offshore commercial banks. The sell-buy FX swap operation is generally planned to help lessen the amount of withdrawal needed to be done through repurchase operations. The BOT will either call banks directly asking for quotes or access the market via brokers. The transactions are undertaken throughout the day, usually for one- or two-day settlement.

Standard tenors are overnight up to 1 year, but the FX swap operations are more typically concentrated on the short ends (up to 3-month).

3.2.2.5 Electronic BOT Debt Security (e-PN) Window

The BOT launched the electronic BOT debt security window on 13 February 2008, after the closure of the BOT-operated repurchase market. This is another channel in which the BOT used to withdraw liquidity from the banking system in order to maintain short-term money market rates.

The characteristic of the e-PN purchase operation is similar to the BOT accepting deposits and issuing e-PN in return. Member financial institutions can bid for BOT debt securities by specifying the amount and the rate of return of each maturity to the BOT during 4 pm – 4.30 pm. The minimum amount per transaction is 100 million baht, with increments in multiples of 10 million baht. The BOT will inform the results of their tenders by 4.45pm, and settlement takes place within 5 pm on the same day.

Figure 11
Electronic BOT Debt Security (e-PN) Window



The financial institutions wishing to access this window are required to apply for membership. Eligible financial institutions are commercial banks, finance companies, credit foncier companies, specialised financial institutions, and other juristic persons approved by the BOT.

Available maturities of the BOT debt securities are overnight, 7 days, 14 days, 1 month, 2 months, 3 months and 6 months. The BOT debt securities are neither transferable nor eligible to be used as collateral.

3.2.3 Standing Facilities

The BOT provides collateralised standing overnight facility called the “End-of-day Liquidity Adjustment Window” through which the BOT offers both overnight lending and borrowing to financial institutions. This allows financial institutions with insufficient liquidity at the end of the day to pledge collateral to obtain liquidity from the BOT and those with excess reserves to lend overnight to the BOT and in return receive a BOT debt instrument (e-PN).

The rate charged on the End-of-day Liquidity Adjustment Window is the policy rate plus or minus an adjustable margin depending upon whether the BOT is lending to or borrowing from financial institutions. Normally, the margin is set at +/- 50 basis points, except for the 3-month period following the closure of the BOT-operated repurchase market (13 February – 12 May 2008) when the BOT temporarily set the margin at +/- 25 basis points. With the policy rate currently at 3.25% per annum, the rates charged on the End-of-day Liquidity Adjustment Windows are at 3.0 and 3.5% per annum. In determining the width of the interest rate corridor, considerations have been taken to ensure that the corridor is sufficiently wide to encourage market players to adjust liquidity among themselves while at the same time narrow enough to ensure that market interest rates will fluctuate within an acceptable range.

Even though there is no restriction on the amount that each institution can borrow through the End-of-day Lending Facility, the borrowing amount is implicitly capped by the amount of each institution's eligible collateral. The overnight lending facility is also provided as part of the BAHTNET RTGS (Real Time Gross Settlement) payment system to accommodate the "spill-over" into overnight liquidity of the free-of-charge intra-day liquidity. In the event that the intra-day liquidity is not repaid by the end of the day, banks will be charged the same interest rate as that of the End-of-day Lending Facility, thereby effectively using the standing overnight credit facility.

Eligible collateral is the same set as eligible securities used in the normal repurchase operations which consist of government bonds, treasury bills, FIDF bonds, government-guaranteed state enterprises bonds, and BOT bonds.

All transactions through the Liquidity Adjustment Window are overnight and are settled on the same day. The facility is available to all financial institutions with deposits at the Bank of Thailand. Eligible financial institutions are commercial banks, finance companies, finance and securities companies, and specialised financial institutions. The facility is available every working day from 16.30-17.30 except on days with some technical problems, the opening hour could be extended to accommodate the payment system.

Apart from its role as liquidity provider, as shown above, the BOT also plays a crucial role as financial supervisor and regulator for banks and non-banks.

3.3 Role as Financial Regulator

The role, responsibilities and supervisory framework of the BOT are provided under three major enactments, namely, the Bank of Thailand Act, the Financial Institutions Businesses Act, and the Deposit Protection Agency Act. They have been amended and came into force in 2008. These laws are intended to enhance the BOT's independence, strengthened risk-based supervision, and consumer protection. They also reflect a high degree of compliance with the international standards. These help ensure the safety and soundness of the banking system in Thailand.

Following the 1997 crisis, the BOT supervisory framework has been gradually reformed and improved with the emphasis shifted to risk-

based, focusing more on a forward-looking approach and high-risk area. Risk-based supervision was adopted.

3.3.1 Key Developments in Bank Supervision in Thailand

Apart from the amendment of the key legislations as mentioned above, the following are some of the major enhancements on Thai bank supervision:

1) Implementation of Basel II Framework

The Bank of Thailand scheduled to implement Pillar 1 within the end of 2008, Pillar III by mid-2009, and Pillar II within 2010. To date, the BOT is making progress according to plan.

2) Implementation of Consolidated Supervision

The BOT released the Consolidated Supervision Guidelines for banks in 2006. A full set of the Consolidated Supervision Policy was issued after the Financial Institutions Business Act became in effective since August 2008. Commercial banks have identified their financial group structure and submitted it to the BOT for approval.

3) Implementation of International Accounting Standard No. 39 (IAS 39)

The BOT is in the process of preparing for the implementation of IAS 39, which includes studying the accounting standards, drafting practical guidelines and regulations, and assessing the financial and operating impact on the financial institutions.

With regard to this, the BOT has already prescribed two prudential regulations related to IAS 39:

1. Regulation on loan loss provisioning enforced since the end of 2006.

The regulation requires banks to gradually increase their provision to 100% for all loans classified as substandard and doubtful, compared to 20% and 50% previously. The provisioning amount is calculated based on the difference between the loans outstanding and the present value of expected cash flow, either by means of repayment or liquidating collaterals. Consequently, all banks have fully complied with the ruling since 2007.

2. Regulations on accounting, measurement, and the disclosure of structured products, such as Collateralised Debt Obligation (CDOs) and other structured notes.

4. Liquidity Risk Management of Banks in Thailand

4.1 Key Drivers Affecting Liquidity

Liquidity risk is the risk that bank is not able to meet their liability obligation when it comes to due. Liquidity risk, therefore, could stem from both the asset side and liability side. For the asset side, the risk occurs when banks are not able to liquidate the asset in due time, whereas on the liability side, the risk arises when banks are not able to seek the fund in due time or with high funding cost.

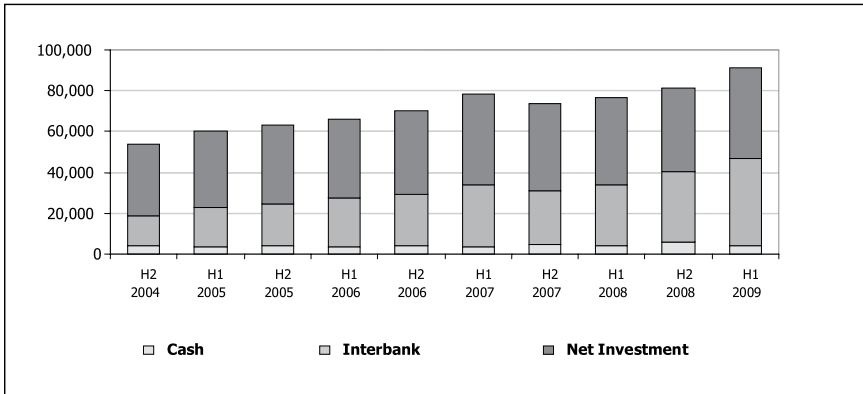
Banks liquidity is influenced by a variety of factors. The external factors could be attributed to an economic condition, market competition, market vulnerability, attitude or belief, or law and regulation. Whereas, the internal factors affecting liquidity in banks are business strategy, source of fund structure, off-balance sheet like derivative trading, and market accessibility.

In addition to the above factors, overall bank reputational risk, direct interbank exposures, market liquidity in capital markets and disruptions in payment systems also provide the channels for liquidity problems affecting an individual bank to spill over causing a market-wide disruption of liquidity, like the effects of a contagion.

To manage liquidity condition in banks, it is crucial for banks to keep in balance their sources of funding and their uses of funds. Banks have to match their assets and liabilities in terms of tenor, amount, and currency. Funding mismatch could give rise to liquidity problems.

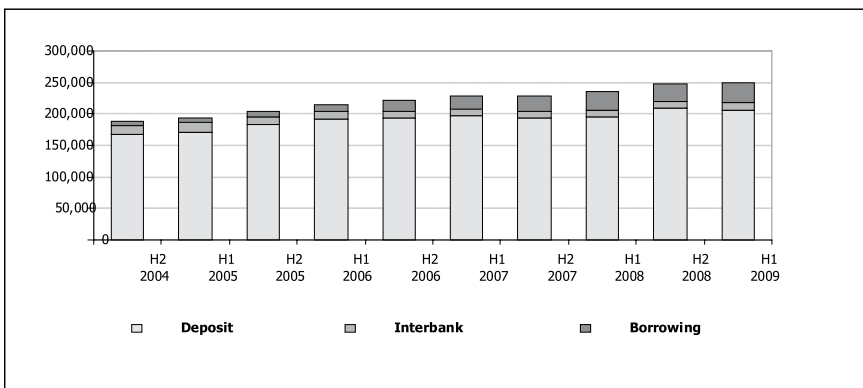
For liquidity on the asset side, the key asset in banks' portfolio nowadays is bonds and securities. Banks normally hold Thai Government bonds and securities.

Figure 12
Bank's Key Asset



On the liability side, deposit seemed to be the key source of liability in the bank's balance sheet. After the adoption of Deposit Protection Agency Act, banks have increasingly issued bill of exchange as another source of capturing funds from the public.

Figure 13
Bank's Key Liability



Liquidity would be reflected from both the asset and liability side of a bank. If the bank's assets exceed its liabilities, then the liquidity is in surplus. On the other hand, if the bank's liabilities are larger than its assets, the bank may encounter a liquidity shortage.

Too much surplus liquidity might create an additional cost burden to the bank and reduce the profitability of the bank in the future.

4.2 Liquidity Risk Management of Banks in Thailand

To foster banks in managing their liquidity risk, the Bank of Thailand issued the Guideline on Liquidity Risk Management. The Guideline has been amended on January 2010, in order to follow the Basel Committee on Banking Supervision (BCBS) new Principles of Liquidity Risk Management in September 2008. The Guideline sets out the principles to strengthen the measurement and management of the liquidity risk in banks. Bank should specify the proper level of risk tolerance that matches with the bank's complexity, risk profile, and business model. The level of risk tolerance should be approved and regularly reviewed by bank's Board of Directors. The level of risk tolerance would be aligned with the level of liquidity cushion and survival period the bank specifies. In managing their liquidity position, it is prescribed in the Guideline that banks should maintain a cushion of unencumbered, high quality liquid assets as an insurance against a range of stress scenarios. On top of that, banks should establish a sub-committee to be responsible for the liquidity risk management, including policies and strategies like Asset Liability Committee (ALCO). Banks should not only manage the liquidity in the bank, but extend the practice to cover significant institutions in their conglomerates as well, for instance, securities company or asset management company.

Banks basically should set out the liquidity risk management system to identify, measure, monitor, and control the liquidity risk. The system should be forward-looking deploying such tools as cash flow projection. In the projection, banks should perform a behavioral adjustment to their analysis for both the asset side and liability side. Assumptions and scenarios should be sound and reasonable. This would help the projections to be more accurate and reflect the actual cash inflow and outflow. Data for the analysis should cover significant on-balance sheet items and off-balance sheet positions. Banks should monitor their sources of funds and uses of funds, along with the concentration and diversity of funds. It is crucial in the diversification of funds to take into account the counterparties, products, financial instruments, markets, and currencies.

Among other things, banks should conduct regular stress tests for a variety of short-term and protracted institution-specific and market-wide stress scenarios and use the outcomes to develop robust and operational contingency funding plans. In addition, banks ought to ensure the alignment of risk-taking incentives of individual business lines with the liquidity risk exposures the activities create. Another important issue is that banks should pay high attention to actively manage its intra-day liquidity

positions and risks to meet payment and settlement obligations on a timely basis under both normal and stressed conditions, thus contributing to the smooth functioning of the payment and settlement systems.

On top of the above, banks should have a proper database and reporting system in place. Bank should have a system to report liquidity information and stress test results regularly to bank's management, sub-committee, and Board of Directors and on a timely basis.

In the Guideline, banks are encouraged to conduct liquidity stress test regularly at least on a quarterly basis. Assumptions should be set in accordance with the current market environment, business strategies, and other relevant factors. The test should cover institution-specific crisis, market-wide crisis, and the combination of both. Assumptions should take into account the bank's characteristics, weaknesses, interconnection of other risks to a liquidity risk, and the connection between market liquidity to the bank's funding capability. Haircut on the value of assets, like fixed income securities or foreign currency, should be set reasonably for the stressed time.

The Bank of Thailand also encourages banks to disclose sufficient information with regard to their liquidity position regularly utilising both qualitative and quantitative data. This would help enhance the efficiency, transparency, and discipline in the market.

The level of liquidity risk management would depend on the size, nature of business and complexity of a bank's activities. The selection of tools and indicators would primarily depend on the bank's business model, historical bank's crisis, and nature of cash inflow and outflow.

In the practice of liquidity management, banks would have a well established sub-committee like ALCO to set up liquidity policies and strategies, establish funding strategy, and oversight of the overall liquidity management of a bank. The treasury function is normally responsible for short-term or intra-day liquidity management and cash flow projection, while the Asset Liability Management (ALM) would perform medium-to long-term liquidity management. Business units like the lending department or deposit department have a duty to report expected large cash outflows to treasury for their management and projection. The risk management function would normally monitor and control liquidity risk and limits, together with performing stress test modeling and behavioral adjustment. The risk management in several banks serves as an operational arm for ALCO.

A common approach for measuring and managing liquidity risk is the use of cash flow projections by mapping expected future cash inflows and outflows to maturity buckets and doing a liquidity gap analysis, while accounting for expected counterbalancing capacity in the business to fill those gaps. Counterbalancing capacity refers to the liquidity that a firm is expecting to be able to access over a given time frame. The cumulative sum of all cash inflows comprises the liquidity available to cover liquidity outflows from both on-balance and off-balance sheet positions. Liquidity risk should be managed in order to meet the net cumulative cash outflow within a certain time period, starting with one day and going out in time, after applying risk management techniques to reduce the net cumulative cash outflow, and using the liquidity generation from the counterbalancing capacity of assets, liabilities, funding sources and other measures.

Furthermore, Liquidity Gap and Maturity Gap would be viewed as the standard tools of liquidity risk measurement. Negative gap or positive gap would highly depend on bank's view on projected interest rate movement. Banks may have a positive gap if they forecast that the market interest rate is on the rise, whereas a negative gap may be hold if the view of interest rate is decreasing.

Moreover, some banks deploy Early Warning System (EWS) tools as a preventive measure of liquidity risk management. Trigger point, alert, or limit may be prescribed as a warning sign for bank's management to closely monitor and prevent a problem. The definition of an indicative signal can be derived from a qualitative approach or quantitative approach, for instance, downgrade on bank's rating, decline of stock price, deposit outflow, deterioration of long-term borrowing ability, and so forth. Banks should establish clear responsibilities on EWS implementation, including monitoring, analysing, and reporting.

4.3 Quantitative Tools for Liquidity Risk Measurement

With regard to the BOT Guideline and the current practices of Thai banks, some of the quantitative tools and indicators of liquidity risk measurement deployed are listed below.

- (i) Cumulative cash outflows
- (ii) Concentration in assets and liabilities
- (iii) Daily deposit outflow
- (iv) Loan-to-deposit ratio or loan-to-deposit, plus B/E ratio
- (v) Borrowed funds to total assets
- (vi) Commitment to lend to total assets
- (vii) Liquid Asset to illiquid asset
- (viii) Size of mismatch for short term perspective
- (ix) Ratio of liquid asset to short-term liability (liquidity reserve)
- (x) Excess liquidity over the minimum requirement
- (xi) Ratio of large depositor to total liabilities
- (xii) Major source & use of fund
- (xiii) Limit System: Typically a limit system is used to manage liquidity within maturity buckets. Limit systems could vary in their form and application. It can vary from ratio approaches over different time horizons or maturity buckets, to explicit detailed limit-driven steering of funding and revenue generation. Limits can be set for all periods with no possibility of exceeding the threshold at any time as Hard Limit, or with the possibility of exceeding the threshold only for a number of days per period or with permission as Soft Limit, for driving front-office activities through the allocation of liquidity costs, etc.

Those ratios are closely monitored. Banks through their Risk Management Unit monitor and analyse the movement of these ratios, assessing at the same time whether they reach the trigger or not. Normally a report of these indicators is generated daily. The bank's management and Board of Directors are notified on the status and movement of these ratios from time to time, for instance, on weekly, monthly, or quarterly basis.

5. Crisis Management and Bank Resolution

The BOT has in place a sound crisis management framework to facilitate prompt and coordinated action in the event of a crisis. A contingency plan has been prepared to deal with a systemic banking crisis and a continuity plan for disaster events. A crisis management committee

(CMC) chaired by the BOT Governor is designated to act as the central command to coordinate and manage banking crisis resolution. The BOT has established transparent guidelines governing the use of emergency credit to lend to banks perceived as solvent but illiquid. A working group has also been set up to formulate scenarios for testing once every year and to provide feedback to make improvements in the contingency plans.

Regarding the Liquidity Management Guidelines issued by the Bank of Thailand, banks should prepare the contingency plan that specifies policies, strategies, and process in the time of crisis. The plan must be in a written form and be flexible enough for implementation. Banks should set a plan to be able to cover different levels of crisis severity. Banks should also establish a Contingency Funding Plan that suits their financial performance, strategies, complexity of transaction and bank's risk profile.

The Liquidity Contingency plan should align with the bank's business continuity plan. The Liquidity Contingency plan should be reviewed at least yearly. In the plan, communication and public relations action plan and process should be clearly established to communicate both within the organisation and to others like bank's depositors, creditors, press, shareholders, and the Bank of Thailand.

5.1 Lessons Learned

For Thailand, learning the lessons of the 1997 financial crisis have helped the nation survive through the current global turmoil. The dangers of funding mismatches and highly leveraged balance sheets are among the key lessons learned by Thailand a decade ago. Emerging from the crisis, Thai banks have significantly improved their financial discipline and skills in managing financial risks inherited in the banking environment. With regard to the recent global financial crisis in 2008, it was inevitable for Thai banks to be impacted. They saw their profits come under pressure. Nevertheless, their balance sheet remained relatively strong. Thai banking sector today remains resilient, with ample liquidity and capital funds.

The previous Asian financial crisis had led to many important policy reform initiatives, all of which were aimed at strengthening the robustness and risk management discipline of the domestic financial system. In the case of Thailand, following the restoration of financial stability in the early 2000s, financial reform became the top priority, with emphasis on prudent regulations and strong risk management.

Thai banks also adopted a macro-prudential approach in the early 2000s, in recognition of the systemic linkages between the financial system and the macroeconomic conditions. From 2003 to 2006, a series of macro-prudential measures were introduced, aiming at controlling the rapid growth of credit, especially credit card loans and mortgage loans. The preventive measures that were introduced included placing limits on the loan-to-value ratio for luxury mortgage, raising minimum repayment requirements for credit cards and personal loans, and strengthening the NPL provisions by fair valuation standards of International Accounting Standard 39. These measures have been useful in reducing excessive leverage and household indebtedness, thus helping to maintain stability in the Thai domestic financial system.

Risk-based supervision was a key driving force in strengthening the risk management practices of Thai financial institutions. The financial institutions and central banking laws have been overhauled to keep up with the increased complexity of the financial system. The new Financial Institutions Business Act, enacted in August 2009, empowers the Bank of Thailand to regulate banks and non-banks under a consolidated supervision regime. Furthermore, the risk management and governance practices of the financial institutions have also been strengthened. The Board of Directors is now held accountable by law for setting the strategic and policy goals of banks, while corporate governance guidance and notifications under the fit-and-proper rule for the appointment of bank management have been put in place.

Thai banks have been positive in embracing these changes, as they contribute to a more open, more accountable, and more transparent financial system. Risk management and supervision method for Thai banks is progressively forward-looking and highlights the importance of stress testing as a risk management and supervisory tool. During the past four years, the Bank of Thailand has conducted stress testing, both top-down and bottom-up by requiring local banks to do the same, for risk management and capital planning purposes. Currently, stress testing has become an integral part of the supervisory process. From the experience, stress testing is supposed to be an extremely useful process and dialogue for identifying potential weaknesses of banks in a forward-looking manner, as well as in alerting bank management as to the adoption of the necessary corrective actions.

As a result of the macro-prudential framework implemented and the emphasis of supervision that has been placed on improving risk

management of banks, Thai banks have remained resilient to the impact of the global financial turmoil.

6. Conclusion and Policy Recommendations

Looking ahead, there are some challenges posed by the global economic and financial developments. Although the risk-based supervision remains a robust and valid concept, there are some weaknesses when it comes to practice. These weaknesses include the inability to deal with complexity arising from such mechanisms as credit derivatives, securitisation, OTC derivatives, as well as the problem of procyclicality and systemic risk associated with valuation and performance management issues.

Consequently, it is an essential to strengthen risk measurement, management, and supervision, so that banks can truly capture risk of individual institutions overtime, and risk arising from interconnectedness of key components of the system, to safeguard financial stability. It is crucial to strengthen both micro- and macro-prudential regulations.

From the crisis, macro-prudential policy has been increasingly accepted, as it takes into account the interconnectedness within the financial systems as well as between the financial system and the real economy. The issue of systemic risk and procyclicality is highlighted. The proposals by the G20, the BCBS, as well as international accounting standards are in line with the risk-based principle. While the range of policy is extensive, the key driving forces are the strengthening of risk-based micro-prudential regulation, and emergence of the explicit importance given to macro-prudential supervision to tackle the problem of procyclicality and systemic risk.

The key macro-prudential policy framework that has received wide support to deal with procyclicality problems includes the followings. Firstly, there is a proposal for the built-up of capital buffer in the good times to be run down in the bad times and to prevent excessive credit growth. Secondly, provisioning should be linked with expected loss rather than incurred loss. This leads to provision management to be more forward-looking to potential problems in the future.

Finally, the primarily simple and transparent “leverage ratio” should be applied as a complement to risk-based capital requirement under Basel II. Implementation of many such policies is still subjected

to significant work on calibration as well as qualitative issues, such as consistency with risk-sensitive capital framework, and international level-playing field. Such problems magnify in the case of emerging markets, which face constraint on data and institutional capacity.

However, the reform will need to pay proper attention to capacity building and collaboration of banks and regulators.

Turning to the key micro-prudential policy framework currently being discussed at the international forums to ensure individual financial institution's stability, the BCBS has proposed a package to address previous shortcomings in risk-based supervision as follows. For Pillar I, the regulatory capital for securitisation exposure is enhanced. In addition, the quality and transparency of capital is strengthened especially Tier I capital, which would consist mainly of common equity and retained earnings.

For Pillar II, the supplemental guidelines are issued by requiring banks to manage firm-wide, concentration and reputational risks more effectively. Valuation and stress-testing practices are also improved. Moreover, compensation and bonus schemes should be aligned with long-term risk-taking behavior and performance.

Regarding Pillar III, key focus is on disclosure requirements to reduce uncertainties associating with securitisation exposures. Additional requirements include, for example, sponsorship of off-balance sheet vehicles, and re-securitisation exposures.

On top of these, a new consultative paper on liquidity risk management inclusive of new liquidity measurement ratios has been introduced. This new regulation is designed to ensure that banks, particularly internationally active banks, maintain ample liquidity at all times, both in the normal period and stress time, underpinned by longer-term structural liquidity ratio. In this regard, liquidity stress scenarios would be determined by supervisors.

Our stance on the implementation of any new regulatory and supervisory change includes the following points. First, regarding micro-prudential policy framework, the BOT already has the process to enhance understanding and adjustment of banks for the implementation of the related standards, for example, through hearings on new measures and the Bank of Thailand notifications and guideline. Macro-prudential

policy framework is a more challenging area, particularly in terms of data limitations and policy calibration.

Amongst these, Basel II implementation, especially adequacy of capital, ICAAP and stress testing practices is on top of the list. The principles stipulated in Pillar II are in line with the existing risk-based supervision used by the BOT, but places greater focus on the qualitative aspect of risk management and assessment of capital adequacy. For example, the role of the Board of Directors and senior management in the assessment and formulation of strategy on capital management for the current and future periods has been stressed.

In this regard, banks would ensure they have a good risk management system, with an ICAAP that covers all significant risks, including those stipulated under Pillar I as well as other risks. These other risks should at least include credit concentration risk, interest-rate risk in banking book, liquidity risk, strategic risk and reputational risk. Moreover, it is desirable that banks maintain capital above the minimum regulatory requirement to withstand future losses both in normal and stress situations.

To achieve this, banks should conduct stress tests and formulate capital plan in accordance with the stress test results in a systematic and continuous manner. Thai banks are assuming to start using their ICAAP by the end of December 2010.

Moreover, in maintaining adequacy of capital over the business cycle, it is very important to focus on countering procyclicality. Thai banks should have sufficient capital, liquidity, and provision buffer over the business cycle.

After the trend of universal banking, banks are inclined towards having their own financial groups to better accommodate market needs. Therefore, it is crucial to focus on consolidated supervision to ensure adequacy not only in capital, but also in risk management of the entire banking group, particularly with regard to liquidity risk.

With respect to foreign banks, cross-border supervisory coordination should be strengthened, particularly on better information sharing between home and host supervisors. This has proven to be crucial as the current crisis shows that there is a need for home supervisors of global financial conglomerates and banks to recognise that global bank's

local operations may be systemically important for the host economies, particularly concerning the liquidity issue. The interconnection between markets and institutions is in view.

In conclusion, the bank business model is likely to become more conservative, placing less reliance on wholesale financing and use of leverage, while focusing more on risk management and higher liquidity buffer. Consumers themselves will be more risk averse preferring to stick with simple transactions and products. The regulatory framework will be strengthened, especially the use of macro-prudential oversight that focuses on system-wide stability. As such, closer supervision of systemically important financial institutions, including non-banks, will be crucial. Finally, the micro-prudential oversight will also be strengthened to rectify the previously identified problems, particularly the Basel II framework, corporate governance, and incentive misalignment. These will strengthen the resilience of the Thai banking sector, and a strong financial system will be the backbone of sustainable economic growth in the long term.

